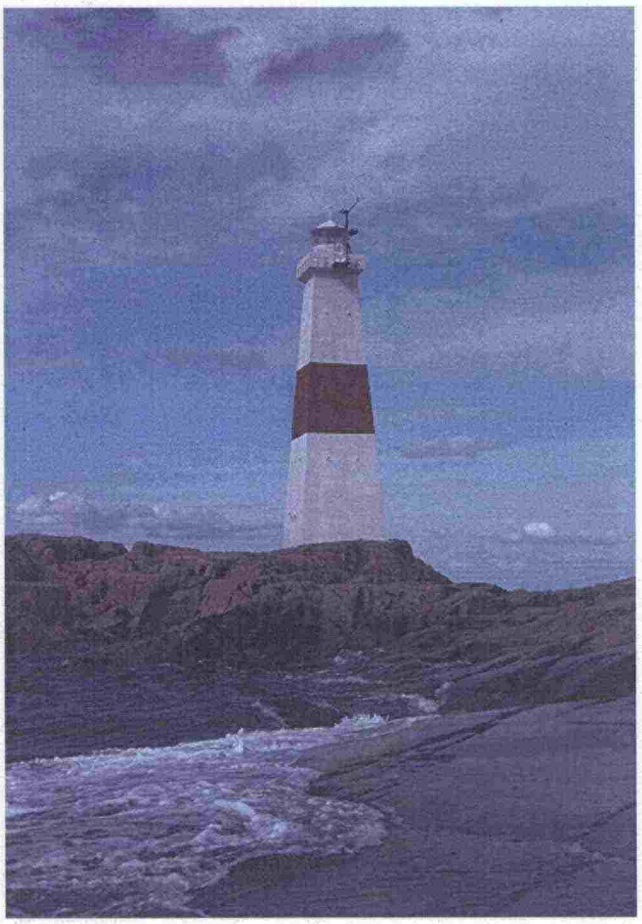
Merenkulkulaitoksen julkaisuja 8/2000

Ports and Maritime Environment in the Gulf of Finland

Seminar report



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Ports and Maritime Environment in the Gulf of Finland

Seminar report

20-22 September 1999
Hanasaari Culture Centre, Espoo, Finland

Editor: Hanna Perälä

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Ports and Maritime Environment in the Gulf of Finland - Seminar report

Abstract

The building of new ports and forecasts predicting a growth in navigation have increased both the citizens' concern and international debate on the environmental effects of these ports and the accident risks they represent, as well as the state of the Baltic Sea environment in general. To protect the environment, we need an overall evaluation of the new plans and the effects of navigation on the Baltic Sea and its coastal regions, as well as more efficient international co-operation to monitor the state of the environment and to increase the capacity for fighting oil disasters. As a first priority, however, we should look at preventive measures, such as the identification and minimisation of transport related risks and the adverse effects on the environment.

The citizens and non-governmental organisations have also made justified demands for more information on the new plans, and an international evaluation of their environmental impacts. This aspect has been taken up in the bilateral negotiations between Finland and Russia, and more recently also in those between Russia and the EU. Hopes have been expressed that in international environmental impact studies, the spirit and principles of the Convention on Environmental Impact Assessment in a Transboundary Context approved within the framework of the UN European Commission on Economics in 1991 could be applied in the international evaluation of environmental impacts of port projects, even though the ratification procedures with Russia still are incomplete.

In addition to being a source of spiritual and material well-being, the Baltic Sea is a shared concern for its coastal nations. To hand down to future generations a vital Baltic Sea, not only highest expertise but also efficient measures and international co-operation are required. It is crucial to make available to the general public the results of the seminar through this publication and thus build up international co-operation for the protection of the Baltic Sea.

Keywords

port, environment, environmental impact study, Baltic Sea

Miscellaneous

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FOREWORD

On the 20th to 22nd of September 1999, the Finnish Ministry of the Environment and the Finnish Maritime Administration organised in Hanasaari Conference Centre a seminar named 'Ports and Maritime Environment in the Gulf of Finland'. This seminar focused on plans aiming at developing ports and navigation in the Gulf of Finland, as well as on international co-operation in related issues, such as environmental protection. Over 110 people took part in the seminar. They represented the communications and environmental authorities, research institutes and businesses from Finland, Russia, Estonia, Latvia and Lithuania. This publication contains the papers and introductions heard at the seminar, as well as its most central conclusions.

The idea to organise a thematically broad port seminar came up in the meetings between the Finnish and Russian port authorities that have taken place at regular intervals ever since the year 1994. At that time, in a transport seminar arranged by the Finnish Ministry of Transport and Communications and the Mayor's Office of St Petersburg, the need was observed for increased co-operation in port matters in the Gulf of Finland area, both in Finland and in Russia.

As the dates of the Hanasaari seminar were confirmed, it proved practical to combine the resources of both the Finnish Maritime Administration and the Ministry of the Environment in the organisation work. This made it possible to deal with a wide range of environmental questions inherent in any plans to develop ports. At the same time, the themes of the seminar could be extended to cover the whole Gulf of Finland area, thus soliciting the active participation of representatives from other Baltic countries in the discussion on the development of ports and navigation in this region.

The building of new ports and forecasts predicting a growth in navigation have increased both the citizens' concern and international debate on the environmental effects of these ports and the accident risks they represent, as well as the state of the Baltic Sea environment in general. To protect the environment, we need an overall evaluation of the new plans and the effects of navigation on the Baltic Sea and its coastal regions, as well as more efficient international co-operation to monitor the state of the environment and to increase the capacity for fighting oil disasters. As a first priority, however, we should look at preventive measures, such as the identification and minimisation of transport related risks and the adverse effects on the environment.

The citizens and non-governmental organisations have also made justified demands for more information on the new plans, and an international evaluation of their environmental impacts. This aspect has been taken up in the bilateral negotiations between Finland and Russia, and more recently also in those between Russia and the EU. Hopes have been expressed that in international environmental impact studies, the spirit and principles of the Convention on Environmental Impact Assessment in a Transboundary Context approved within the framework of the UN European Commission on Economics in 1991 could be applied in the international evaluation of environmental impacts of port projects, even though the ratification procedures with Russia still are incomplete.

In addition to being a source of spiritual and material well-being, the Baltic Sea is a shared concern for its coastal nations. To hand down to future generations a vital Baltic Sea, not only highest expertise but also efficient measures and international co-operation are required. It is crucial to make available to the general public the results of the seminar through this publication and thus build up international co-operation for the protection of the Baltic Sea. We wish to extend our thanks to all those who helped to make the seminar a success, as well as to all the participants for their active inputs in the seminar.

Helsinki, 1st September 2000

Pekka Jalkanen
Director General
Environmental Protection Department
Ministry of the Environment

Keijo Kostiainen
Director of Department
Hydrography and Waterways Department
Finnish Maritime Administration

PROGRAMME

Monday 20th September

9.00 – 9.30 Registration and coffee

9.30 WELCOMING ADDRESSES
Mr. **Pekka Jalkanen**, Director General, Head of Environmental Protection Department, Ministry of the Environment of Finland
Mr. **Kyösti Vesterinen**, Director General, Finnish Maritime Administration

9.50 CHAIRMAN'S OPENING REMARKS
Mr. **Heikki Kleemola**, Research Director, Technical Research Centre of Finland VTT

10.00 – 11.45 KEYNOTE ADDRESSES

10.00 MARITIME SAFETY AND MARITIME TRAFFIC NOW AND IN THE NEXT DECADE
Mr. **Raimo Kurki**, Deputy Director General, Ministry of Transport and Communications of Finland

10.20 THE BALTIC SEA AS A GATEWAY TO MARKETS
Mr. **Peeter Škepast**, Deputy Secretary General, Ministry of Transport and Communications of Estonia

JOINT CONCERN ABOUT IMPACTS OF MARITIME TRANSPORTATION IN THEBALTIC SEA AREA
Ms. **Anne Christine** Brusendorff, Maritime Secretary, HELCOM Secretariat

10.55 RUSSIA'S MARINE ENVIRONMENTAL POLICY IN 2000
Mr. **Valery M. Zaitsev**, Head of Inspection, Maritime Inspection, Russia

11.10 THE ORGANISATIONAL STRUCTURE, PRESENT SITUATION AND FUTURE VISIONS OF THE RUSSIAN SEA PORTS
Mr. **Pavel Reivart**, Head, Department of Law of the Sea, Ministry of Transport of Russia

11.30 DISCUSSION

11.45 *Lunch*

The afternoon is divided into two parallel sessions:

13.00 Session I: Maritime Environment
Chairman: Mr. **Olli Pahkala**, Environment Counsellor, Environmental Risk Management, Ministry of the Environment of Finland

13.00 ENVIRONMENTAL RULES AND CONVENTIONS
Mr. **Jorma Kämäräinen**, Senior Maritime Inspector, Finnish Maritime Administration

13.00 Session II: Port Technology
Chairman: Mr. **Kimmo Mannola**, Director, Hydrography and Waterways Department, Finnish Maritime Administration

13.00 DEFINING WIND LIMITS IN PORTS AND ENTRANCE CHANNELS
Mr. **Jorma Rytkönen**, Group Leader, Technical Research Centre of Finland VTT, Manufacturing Technology

13.30	EMISSIONS FROM MARITIME TRAFFIC Mr. **Harri Pietarila**, Senior Research Officer, Finnish Meteorological Institute	13.30	COST 330 Mr. **Pekka Koskinen**, Director, Oy EDI Management Finland Ltd
14.00	FULFILLMENT OF MARPOL REQUIREMENTS IN RUSSIAN SEA PORTS Professor **Nickolay Ivanov**, Head of Ecology Department, Baltic State Technical University, Russia	13.50	PLANNING A NEW PORT – CASE MUSSALO IN KOTKA Ms. **Riitta Kajatkari**, Technical Director, Port of Kotka, Finland
14.30	Coffee	*14.30*	*Coffee*
15.00	OIL SPILL PREPAREDNESS IN ESTONIA Mr. **Arvo Luksepp**, Director, Estonian State Sea Inspection Office	15.00	CONTROL OF ENVIRONMENTAL SAFETY AT PAKTERMINAL Mr. **Jaan Vainu**, Safety Officer, PakTerminal Ltd. Tallinn, Estonia
15.20	OIL SPILL PREPAREDNESS IN THE GULF OF FINLAND Mr. **Kalervo Jolma**, Group Manager, Environmental Emergency Response, Finnish Environmental Institute	15.30	INFORMATION SYSTEMS IN A MODERN CONTAINER TERMINAL Mr. **Pekka Rautiainen**, Director of Information Services, Finnsteve Oy Ab, Finland
15.40	OIL SPILL CONTINGENCY PLAN OF RUSSIA Mr. **Dimitri Kalenichenko**, Managing Director, Baltic Salvage and Towage Co., Russia		
16.00 – 16.15	DISCUSSION	16.00 – 16.15	DISCUSSION

19.00 – 21.00 EVENING RECEPTION IN KARHUSAARI, hosted by the City of Espoo

Tuesday 21st September

9.00	**Session I: Maritime Environment** Chairman: Mr. **Allan Gromov**, Director General, Ministry of the Environment of Estonia	**9.00**	Session II: Port Technology Chairman: Mr. **Pavel Reivart,** Head, Department of Law of the Sea, Ministry of Transport of Russia
9.00	ENVIRONMENTAL IMPACT ASSESSMENT (EIA) IN PORTS Mr. **Risto Hakala**, General Manager, Enrocon Ltd, Finland	9.00	SIMULATION MODELS IN PORT PLANNING Mr. **Seppo Holmberg**, Director, EP- Logistics Oy, Port Planning Department, Finland

9.20	THE RISK OF MARITIME TRAFFIC AND TERMINAL CONSTRUCTIONS NOW AND IN THE FUTURE Mr. **Jorma Rytkönen**, Group Leader, Technical Research Centre of Finland VTT, Manufacturing Technology	9.40	THE ICE CONDITIONS OF THE GULF OF FINLAND AND THE PREREQUISITES FOR ROUND-THE-YEAR TRAFFIC Dr. **Kaj Riska**, Professor, Helsinki University of Technology, Ship Laboratory, Finland
9.40	CLEANING OF THE MARINE ENVIRONMENT FROM OLD AND SUNKEN SHIPS AND VESSELS Mr. **Alexander A. Startsev**, General Director, St. Petersburg Shipbreaking Yard, Russia	10.10	ENVIRONMENTAL CONDITIONS IN PRIMORSK – THE CHALLENGES FOR SUCCESSFUL TECHNICAL SOLUTIONS FOR SAFE SHIPPING Mr. **Mikko Niini**, Vice President, Kværner Masa-Yards Inc., Finland
10.00	PRESENT AND FUTURE PLANS IN ESTONIAN PORTS Mr. **Valdo Välja**, Head of Port Register Bureau, Estonian National Maritime Board		
10.30	*Coffee*	*10.35*	*Coffee*
11.00	PRESENT AND FUTURE PLANS IN LITHUANIAN PORTS Mr. **Juozas Karalavičius**, Head, Environment Protection Department, Klaipeda State Seaport Authority, Lithuania	11.05	THE RESTRUCTURING OF RUSSIAN SEA PORTS – PROBLEMS AND SOLUTIONS Mr. **Boris Nosov**, Deputy Director, Sojuzmorniiprojekt, Russia
11.30	PRESENT AND FUTURE PLANS IN LATVIAN PORTS Mr. **Vladimir Kozacenko**, Head of the Port Division, Maritime Department, Ministry of Transport, Latvia	11.45	FINANCING METHODS AND PRINCIPLES OF PORT CONSTRUCTION Mr. **Eero Leppänen**, Deputy Managing Director, Finnish Ports Association
12.00	DISCUSSION	12.00	DISCUSSION

12.15 *Lunch*

13.15 – 15.10 AFTERNOON SESSION

13.15 PANEL DISCUSSION

Chairman: Mr. **Kimmo Mannola**, Director of Department, Finnish Maritime Administration

Panelists:

Ms. **Anne Christine Brusendorff**, Maritime Secretary, HELCOM Secretariat
Mr. **Allan Gromov**, Director General, Ministry of the Environment of Estonia
Mr. **Seppo Holmberg,** Director, EP-Logistics Oy, Port Planning Department
Professor **Nickolay Ivanov**, Head of Ecology Department, Baltic State Technical University, Russia
Mr. **Boris Nosov**, Deputy Director, Sojuzmorniiprojekt, Russia
Mr. **Olli Pahkala**, Environment Counsellor, Ministry of the Environment of Finland

14.30 – 14.50 **CLOSING REMARKS**
Mr. **Kimmo Mannola**, Head of Department, Finnish Maritime Administration
Mr. **Olli Pahkala**, Environment Counsellor, Ministry of the Environment of Finland

14.50 *Coffee*

17.30 VISIT TO THE OIL TERMINAL IN SKÖLDVIK

Wednesday 22nd September

9.00 – 12.00 VISITS TO COMPANIES, ENVIRONMENTAL ORGANISATIONS AND CONSULTING AGENCIES

PARTICIPANTS

Aapro, Risto	Project Manager	Plancenter Ltd, Finland
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Arminen, Lassi	Managing Director	Port of Kotka, Finland
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Mikkonen, Rhanus	Interpretor	
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Nechiporenko, Anatoliy	Head	Environment Protection Service, Marine Administration of 'Vanino and Soviet Harbor' Port, Russia
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Niini, Mikko	Vice President	Kværner Masa-Yards Inc., Finland
Nosov, Boris	Deputy Director	Sojuzmorniiproekt, Russia
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Repin, Aleksei	Interpretor	

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Tervo, Vappu	Senior Adviser	Ministry of the Environment of Finland
Tolonen, Tarja	Interpretor	
Tuomainen, Ilmari	Counsellor	Ministry of Foreign Affairs of Finland
Turtiainen, Matti	General Manager R&D	ABB Industry Oy, Marine Group, Finland
Vainu, Jaan	Safety Officer	PakTerminal Ltd., Estonia
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Varsamäki, Aku	Manager	Fundus Ltd, Finland
Wasström, Kim	Sjöfartskonsulent	Ålands Redarförening, Finland
Venäläinen, Pirjo	Researcher	Centre for Maritime Studies, Finland
Veskimets, Arvo	Deputy Director General	Estonian National Maritime Board
Vesterinen, Kyösti	Director General	Finnish Maritime Administration
Viil, Avo	Head of Dept. Development	Port of Tallinn, Estonia
Virtanen, Juha	Senior Adviser	Ministry of the Environment of Finland
Voutilainen, Esko	Project Manager	Fortum Oil and Gas Oy, Shipping
Vuoristo, Jouko	Head of Section	Finnish Maritime Administration

Vähäkyrö, Ilse	Librarian	University of Turku, Finland
Välja, Valdo	Head	Port Registration Bureau, Estonian National Maritime Board
Vänskä, Helena	Senior Adviser	Ministry of Transport and Communications of Finland
Zaitsev, Valery M.	Head of Inspection	Maritime Inspection, Russia
Zarembo, Anna	Dr. of Chemistry	Technical Research Centre of Finland VTT

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Mr. Pekka Jalkanen
Director General
Head of the Environmental Protection Department
Ministry of the Environment of Finland

WELCOMING ADDRESS

Ladies and Gentlemen,

'Ports are strategically important parts of the transport infrastructure and foreign trade of every country. Ports are also excellent indicators of the economic state of a country'.

The volume of maritime transports on the Gulf of Finland is, in some forecasts, expected to double by 2010 - 2015. Whether this will come true is largely dependent on how long it takes to modernise and expand the old ports and harbours on the Gulf of Finland, on the extent of this work, and on how the building of new ports progresses. Here, Russia´s plans for new ports in the eastern part of the Gulf of Finland are decisive.

Russia's Baltic ports are important transport hubs, a kind of logistic culmination points linking Russia to the western world. Almost all of Russia's trade with Western Europe, and most of the western trade, passes through the Baltic ports. Moreover, the mouth of the Neva River is the gateway connecting the Baltic Sea to the waterways leading to the White Sea, the Barents Sea, the Caspian Sea, and the Black Sea.

After the break-up of the Soviet Union, only three of Russia's formerly eight ports on the Baltic remained, namely, St. Petersburg, Kaliningrad and Vyborg. Consequently, a large portion of Russia's foreign trade sea transports that was once shipped by sea is now shipped by rail, in transit through the Baltic countries and Finland.

To compensate its lost port capacity, the Russian Federation prepared a restructuring programme, which was ratified in 1993. Under the programme, three new ports will be built in the Leningrad oblast, namely, Ust-Luga, Primorsk and Buhta Batareinaja, with a total capacity of 95 million tonnes a year.

To speed up building, President Yeltsin issued a ukase in 1997 that the governments of the Leningrad oblast and St. Petersburg were to prepare a joint plan for developing transit trade on the Gulf of Finland coast. In addition to more port capacity, this programme includes the building of roads, railroads, waterways and river ports, as well as new freight terminals with improved computer-based freight management systems. The programme is also closely connected to Russia's part in building the Pan-European 9th intermodal transport corridor.

Russia plans to develop, along its 600 km long shoreline on the Gulf of Finland, altogether 17 new harbours and terminals with a total capacity of some 120 million tonnes a year. Of this amount, 65 million tonnes annually would consist of oil and oil products. By the year 2010, the planned transport capacity of the inland pipelines to Primorsk and Batareinaja will amount to 80 - 100 million tonnes of oil and oil products a year.

In the next millennium, sea transports will increase several times over, as compared with the present situation, as the old ports on the Gulf of Finland are refurbished and expanded, and new ports built. The focal point in sea transports will gradually be transferred from the southern part of the Baltic Sea to the shores of the Gulf of Finland. At the same time, regarding navigation on the Baltic and ecological safety, the risks for environmental accidents will increase greatly, unless there is a simultaneous improvement in navigational safety. Additionally, oil combatting activity and environmental monitoring systems must be improved and rescue capacity extended. I would like to stress that we will need increasingly efficient international co-operation to minimise the risks involved and to forestall environmental damages as effectively as possible.

According to global estimates, some 12 % of the anthropogenic load on the seas comes from sea traffic, 44 % as runoff from land-based sources and 33 % is airborne depositions. If we co-operate as we should, we can considerably reduce the load from sea traffic to the Gulf of Finland and the Baltic Sea. But of course this is not easy.

Environmental protection within the present sea transport systems requires extensive know-how and high professional skills, including oil combatting in ports, reception of oily wastes, deposition of dredging sludge, waste management in harbours, sewage purification, and much improvement in fuel quality.

The conditions laid down by international financing institutions set the level of environmental protection in harbour projects. Presently, it is internationally accepted that environmental investments should be at least 30 % of total costs. The whole transport chain may be subjected to environmental certification, prior to any financing decision. Obviously, in the future, the competitive position of ports will increasingly depend on their level of environmental protection.

Emissions and discharges from sea traffic must be reduced if we want to move forward in the protection of the Baltic Sea and its marine environment. There are a number of international conventions on sea traffic and harbours in the Baltic Sea. The most important are:

- the Convention on the Protection of the Marine Environment of the Baltic Sea Area
- (the Helsinki Convention);
- the International Convention for the Prevention of Pollution from Ships (MARPOL
- 73/78);
- the Convention on the Prevention of Marine Pollution by dumping of Wastes and
- other Matter (the London dumping convention);
- the UN/ECE Convention on Environmental Impact Assessment in a Transboundary
- context, on the basis of which Finland has offered to take part in the assessment of
- the environmental impacts of the new ports.

During the last few years, we have made great progress in implementing these conventions. This progress is clearly visible in some parts of the Baltic Sea, where the ecosystems are now in a better condition than before. But much remains to be done before we can be satisfied with the situation. Navigation and ports still have 'hot spots' regarding environmental protection. Examples are: the need to improve oil combatting capacity in the Gulf of Finland; the need to organise waste reception facilities for oily wastes in all harbours, problems related to the deposition of dredging sludge; and the improvement of navigational safety. In addition, we need to resolve the conflict of interest in the Gulf of Finland between nature conservation goals on the one hand, and the environmental risks of navigation and the environmental impact of harbours on the other.

Recently, the press in St. Petersburg has published an ongoing debate, at times quite intense, relating to the uncertain fate of the Kurgalsk, Lebjahzen and Primorsk conservation areas. These areas are located in the immediate vicinity of the planned new main ports. Finland and Russia are working together to establish a conservation area in the eastern part of the Gulf of Finland, and we are expecting to hear soon from the Russian nature conservation authorities about the project. The future of these nature conservation areas definitely depends on the level of environmental protection in the harbours in the eastern part of the Gulf of Finland, and on the level of navigational safety.

Protecting the Gulf of Finland and the whole of the Baltic marine environment cannot, in fact, be accomplished without improving harbours and navigational safety. This also comes out in Our Seminar programme in the sessions on the protection of the marine environment and on port technology.

In public debates, the port projects on the Gulf of Finland have been criticised for not taking environmental concerns sufficiently into account. It is my sincere hope that this seminar will contribute to such a holistic view of important trends in navigation and port development, on the options we have, and above all, on how we can best co-operate to safeguard the interests of our common environment in the Gulf of Finland and the marine environment of the Baltic Sea area.

I hope you will enjoy participating in this seminar. Thank you.

Mr. Kyösti Vesterinen
Director General
Finnish Maritime Administration

WELCOMING ADDRESS

Ladies and Gentlemen,

The Gulf of Finland is a very busy area as far as port activities are concerned. The most important ports of Finland are located here. A remarkable share of the international trade of Russia is shipped via Baltic Sea ports, all of which, except Kaliningrad, are located on the Gulf of Finland. Most of the port activities of Estonia are also concentrated to the coast of the Gulf of Finland.

There are a great number of port development projects underway in the area at the moment. The Finnish ports of Hamina, Kotka and Helsinki have started or are going to start considerable new investment projects. Russia has plans to establish several new ports and with them an extensive amount of new port capacity in the Gulf of Finland. The cargo turnover of the port of Tallinn has grown considerably in the last few years and the port has a number of projects underway or under consideration.

The forecast for the growth of Finnish seaborne trade during the next two decades shows that the steady growth we have witnessed in the 1990s will continue. In the long run we can expect that the demand for cargo transports in Russia and the Baltic States will grow even more faster.

The Gulf of Finland is an intersection of several transport corridors defined by EU as subjects of development. There is the Nordic Triangle, which connects the capitals of the Nordic Countries. It is one of the priority projects within the Trans European Transport Network (TEN). Pan-European Corridor 1, Via Baltica, runs from Helsinki to Warsaw. The connection Helsinki - St. Petersburg - Moscow is part of Pan-European Corridor 9.

Ports are not only a very important link between ships and land transportation but also have a very important role in protecting the highly vulnerable marine environment of the Baltic Sea and especially of the Gulf of Finland. Efficient port reception facilities for ship-generated waste are needed to collect all waste which is not allowed to be discharged into the sea.

Ports are also a very convenient place for the control of maritime traffic. Port State Control gives the possibility for a Port State to ensure that ships calling at its ports comply with international regulations, adopted both for the safety of shipping and for the protection of the marine environment. Compliance with international regulationstill requires attention. For example the annual number of observed illegal oil charges originating from ships has been around 400 in the Baltic Sea Area during this decade.

To eliminate these discharges the Helsinki Commission has developed a complex system of measures known as the Baltic Strategy for Port Reception Facilities for Ship-generated Waste and Associated Issues, approved in 1995.

The Baltic Sea states shall apply the 'no-special-fee' charging system for the use of reception facilities. All ships, with a few exemptions, will be subject to mandatory discharge of all waste to a port reception facility before leaving a port. These new regulations will enter into force by 1 July 2000.

The Baltic Strategy, which gives new provisions for both ports and ships, is a very impressive achievement of the Baltic Sea states and a good example of successful regional co-operation for the protection of the marine environment.

Transportation of oil is increasing in the Baltic Sea and new oil terminals are under construction in the Baltic Sea area. Therefore the risk for a major oil tanker accident is increasing. A good way to minimise this risk would be to use only double-hull tankers for oil transportation. The use of transponders in ships and the use of Vessel Traffic Control Systems are essential in order to enhance safety of shipping, especially in the Gulf of Finland.

It is essential to use advanced planning methods and the best available technology in order to minimise the harmful environmental impacts ensuing from port construction projects and port operations. It is also of vital importance for all parties to ensure the economical viability of a future port development project already during the planning process.

Personally, I see a need to intensify our collaboration in order to develop and adopt new port planning methods and new port technology applicable especially in this region.

In this seminar we will examine both environmental questions of ports and maritime transport as well as technological perspectives of port development. I hope this seminar will contribute to the co-operation and the exchange of information both across the borders of different countries and the borders of different branches of expertise.

I wish you a fruitful and rewarding seminar on this beautiful island in the Gulf of Finland. I bid all of you heartily welcome.

Mr. Raimo Kurki
Deputy Director General
Ministry of Transport and Communications of Finland

MARITIME SAFETY AND MARITIME TRAFFIC NOW AND IN THE NEXT DECADE

Chair,
Ladies and Gentlemen,

I thank you for the opportunity to be able to present some general views on maritime safety and maritime traffic in the Gulf of Finland now and in the next decade. This is a pleasant but, at the same time, difficult task for me. We know that maritime traffic on the Baltic Sea will increase substantially during the next ten years. The growth will depend on the economic development in the area. In this development, Russia will play an important role, which will immediately show in the transport volumes in the Gulf of Finland.

I have studied with great interest a report of 15 June 1999 published by the Technical Research Centre of Finland. It examines marine traffic and port activities of the Gulf of Finland now and in the future.

According to this report on ports and maritime transport, new ports and enlargement and upgrading of older ones will indirectly mean a significant increase in maritime traffic in the Gulf of Finland. The report estimates that transport performance will double from its present level by 2010/2015. In the light of the report, transport of oil products may even increase three-fold.

It is estimated that maritime transport volumes will increase also globally. Sea transports generally and also oil transports have increased all the time from mid-eighties.

Ventspills, Muuga and Porvoo (Sköldvik) are the most important oil ports in the Baltic Sea area. In the Gulf of Finland oil transportation amounted to 35 million tons last year. Total maritime traffic in the Gulf of Finland is 80 million tons annually as you can see here.

According to the estimates of the Ministry of Transport and Communications of Finland (published in the series B, 27/98, called Transport Forecasts until 2003), maritime transport in Finland, including transit transport, will grow approximately 3 per cent a year, which is at the same speed as the volume of the entire foreign trade.

The above mentioned report of the Ministry shows that the passenger transport between Finland and foreign countries has doubled from mid-eighties to the mid-nineties. It is also very illuminating that the report by the Technical Research Centre of Finland that I mentioned earlier maintains that passenger volumes in maritime traffic between Finland and Estonia have grown more than 23-fold from 1983 to 1995. However, the end of tax-free sale, the membership of Estonia in the EU and certain other elements generate such instability that the Ministry of Transport and Communications forecasts the international passenger transport to and from Finland to stay at the present level of 16 million passengers per year until 2003.

According to the preliminary information I have received from my Swedish colleagues the value of Sweden's foreign trade with Poland, the Baltic countries and Russia will grow by 160 – 170 per cent up to the year 2015. Certainly this growth will be seen in sea traffic volumes.

Ever increasing maritime traffic volumes have set new requirements for securing maritime safety and environmental protection in the area of the Gulf of Finland and all over the Baltic Sea area. This requires co-operation between the seaboard countries and more intensive co-operation between ports and shipping companies as well. We have shallow brackish water and heavy, indeed, increasing marine transportation figures with planned new oil terminals in the Baltic Sea area.

The environmental supranational co-operation in the Baltic Sea area is carried out within the framework of the Baltic Marine Environment Protection Commission – also known as HELCOM/Helsinki Commission. On the EU level there are two working groups, which include also the representatives of Russia and the Baltic States that apply for a membership in the EU. The working groups deal with port and maritime traffic issues in the Baltic Sea area.

Recently a decision was made on intensifying the operation of HELCOM through certain re-division of tasks and organisational reforms. I consider that HELCOM has obtained quite significant results and has operated well. Among other things, concrete results have been achieved in the reception of garbage from ships. The EU legislation also takes these results into account.

The technical development of maritime safety and marine environmental protection must ultimately be based on international regulation. In this work, the International Maritime Organisation (IMO) is, of course, the most central forum. The contribution made by Baltic seaboard states to this work has been good, and I believe that it will remain good also in the future.

We all know that, besides co-operation between countries, co-operation in different forms is quite intensive between the Baltic Sea ports, regions, cities, enterprises and organisations representing enterprises. I think this co-operation brings out the issues, which are included in the theme of my representation. Therefore, in this connection I would like to state only that co-operation framework exists and it would be very important to use resources effectively.

Among the actual issues and co-operation fields related to the condition and maritime traffic in the Gulf of Finland, I will mention only the following issues that are based fully on my personal viewpoints:

1) development of control systems for vessel traffic, and promotion of telematics projects in general; 2) development of port operation and vessel technology taking into account environmental protection aspects, and 3) construction of new ports and development of existing ones in the Gulf of Finland.

These issues will be discussed in more detail during the seminar on the basis of representations of real experts. Therefore, from my viewpoint as the Director of the Shipping Unit of the Ministry of Transport and Communications of Finland, I would like to mention only some personal comments on the above issues.

1) The development of vessel traffic control systems and the advancement of maritime traffic and transport telematics in general is the field, the meaning of which we are not able to understand clearly yet. The abbreviations VTS and AIS are clear to us. But in addition to them, information systems for vessel cargo, condition and characteristics, routes etc. will revolutionise the information technology of maritime traffic in the near future. Maritime transport operations will more tightly be connected with rest of the transport chain forming its compatible part.

2) The need to upgrade vessel and port technology is partly due to this integration of maritime transport operations with rest of the transport chain. In view of environmental aspects, these refer to issues extending from motor technology to container handling. For example promotion of short sea shipping will, for its part, require progress in vessel and port technology.

3) When we talk about new ports in the area of Gulf of Finland we usually refer to Russian port projects there. They were discussed at the meeting of Finnish and Russian ministries of transport in St. Petersburg last week, and at the meeting of the Joint Finnish-Russian Committee on Maritime Transport in Helsinki and Kotka three weeks ago. The Russian party said that they have considered environmental aspects both in port construction and in transport management. Furthermore, topics such as the need to improve outdated Russian ice-breaker fleet have also been under preliminary discussions. It is easy to understand the Russians' need to build their own port infrastructure. In conclusion, I would like to say that it is important that there is, and will be, competition between ports and that all aspects, including the environmental ones, in port services are reliable and efficient and that the operator of a vessel calling a port is aware of the cost components that are charged for.

Chair,
Ladies and Gentlemen,

On behalf of the Finnish Ministry of Transport and Communications, I would like to wish, with this keynote address, this seminar all the success. Thank you!

Ms. Anne Christine Brusendorff
Maritime Secretary
HELCOM Secretariat

JOINT CONCERN ABOUT THE IMPACTS OF MARITIME TRANSPORTATION IN THE BALTIC SEA AREA

Introduction

Dealing with impacts from maritime transportation one must take into account the specific physical, chemical and biological characteristics of the marine environment and the special nature of the maritime transport in the Baltic Sea Area. These characteristics include:

- narrow channels, with limited depths (and one limited height), through which ships enter the Baltic Sea;
- shallow brackish water which is renewed only once every 25 - 30 years;
- ice cover during winter time; and
- fauna and flora sensitive to changes in their marine environment,

as well as:

- high traffic density, with possibly around 2 000 ships at sea at any time (excluding the number of smaller vessels);
- large ships, either in the category of oil tankers or passenger ferries; and
- bulk-liquid carriers and ships carrying packaged dangerous goods.

It is generally recognised that regulation of shipping has to be done on a global level as ships go beyond regions. Accordingly, to protect the marine environment of the Baltic Sea Area all ships entering the Area - and not only ships flying the flag of a Baltic Sea State - must comply with adopted regulations.

As will be seen from the below presentation the Baltic Sea States have promoted and will continue to promote the development of international rules within the International Maritime Organization (IMO), taking into consideration the specific needs of the Baltic Sea Area. Moreover, the presentation will show how the Baltic Sea States have adopted regional measures to ensure the effective and harmonised implementation of the international rules. This has usually been done with the aim to see to an earlier - *i.e.*, before the entry into force - implementation of the discharge and related rules of MARPOL 73/78, but as will be shown, the latest example deviates from the normal practise in the sense that the adopted regional measures address MARPOL's shortcomings.

JOINT CONCERN: THE ILLEGAL DISCHARGES

Inquiries into the causes of oil spills show that more than half of all oil which enters the sea does so in connection with operations, whereas accidental spills account for less than a quarter (figure 1). In line herewith the Baltic Sea States annually observe around 500 to 700 illegal oil spillages in the Baltic Sea Area when carrying out their regular aerial surveillance activities. The spillages observed follow closely the busy shipping routes - with concentration of spillages in Kattegat, south-east of Sweden and in the Gulf of Finland (Annex 1). Further the locations of the spillages either coincide with or are situated close to the proposed offshore Baltic Sea Protected Areas, as can be seen in Annex 2. Even small-scale operational spills may cause significant oiling of birds, whereas massive beach cleaning and local destruction of fauna and flora may be the result of larger operational oil spills.

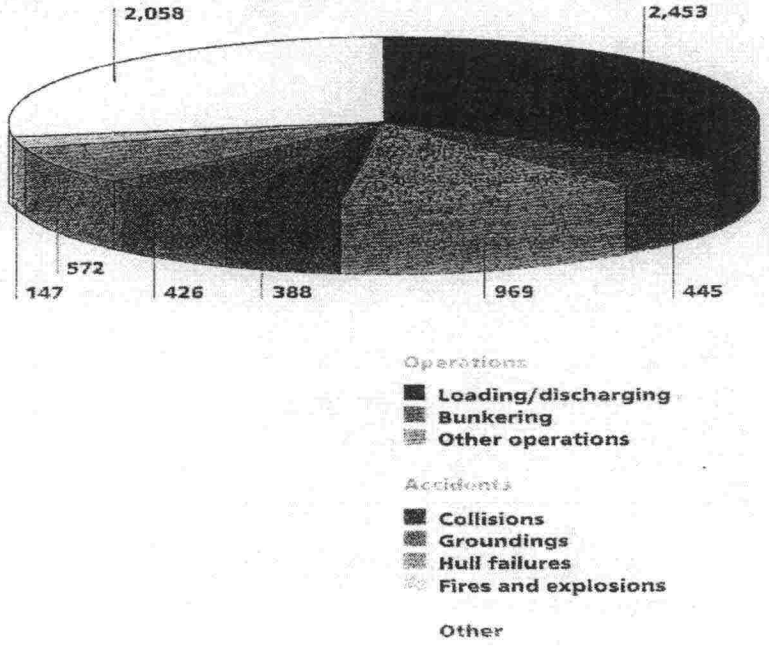


Figure 1. Causes of oil spills between 1975 and 1994. Reference: IMO News No 1 1997.

The Baltic Sea - designated as a Special Area

Observations of illegal oil discharges have not decreased significantly since the Baltic Sea States started to carry out the Aerial Surveillance Flights in 1988, cf. table 1. This gives rise to concern, as the Baltic Sea Area is designated as a Special Area under the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) due to its environmentally sensitive character. Hereby stricter discharge rules apply - sometimes even in the form of prohibitions - compared to the globally applicable discharge rules. Thus, the Baltic Sea Area obtained its Special Area status regarding discharge of oil on 2 October 1983 (Annex I of MARPOL 73/78), regarding discharge of noxious liquid substances carried in bulk on 6 April 1987 (Annex II of MARPOL 73/78) and regarding discharge of garbage on 1

October 1989 (Annex V of MARPOL 73/78). Awaiting the entry into force of the newly adopted Annex VI of MARPOL 73/78 on prevention of air pollution from ships the Baltic Sea Area will obtain yet a special status, *viz.*, a SOx Emission Control Area. In addition, the Contracting Parties to the Convention on the Protection of the Marine Environment of the Baltic Sea Area (the Helsinki Convention) have decided on discharge measures for sewage, on the prohibition of incineration and dumping, as well as on the prohibition of incineration of ship-generated wastes in the territorial seas of the Contracting Parties.

It should be kept in mind that the discharge regulations not only lay down obligations for the ships to follow but also oblige the ports to maintain reception facilities adequate to meet the needs of the ships using them.

Table 1. Oil pollution incidents detected by aerial surveillance in the Baltic Sea Area 1988 – 1997.

Year	Number of incidents
1988	620
1989	785
1990	452
1991	396
1992	566
1993	487
1994	611
1995	649
1996	410
1997	438

JOINT SOLUTION: TO GET AT THE ILLEGAL DISCHARGES

In March 1996 the Helsinki Commission endorsed the Baltic Strategy for Port Reception Facilities for Ship-generated Wastes and Associated Issues (the Baltic Strategy) together with the Project on the Follow-up of the Strategy. The aims of the Baltic Strategy are:

- to ensure ships' compliance with international and regional discharge regulations;
- to eliminate illegal discharges into the sea of *all* wastes from *all* ships; and
- to ensure an environmentally sound treatment of wastes on land.

Two years after the endorsement of the Baltic Strategy the Helsinki Commission adopted several HELCOM Recommendations under the Baltic Strategy in March 1998. These HELCOM Recommendations are backed by a joint HELCOM/IMO Project on 'Enhancement of Reception Facilities for Ships in Eastern Baltic Ports', which among other things deals with mobilisation of financial resources for real investments in ports by addressing donor countries and International Financing Institutions (IFIs).

HELCOM Recommendations adopted under the Baltic Strategy

- compliance with discharge regulations

In order to ensure compliance with the discharge regulations ships are obliged - before leaving the port - to deliver all their wastes which cannot legally be discharged into the Baltic Sea Area (HELCOM Recommendation 19/7).

Such wastes are:

- Oil or oily mixtures from cargo and machinery spaces, cf. Regulation 4 of Annex IV to the 1974 Helsinki Convention and Regulation 10 of Annex I of MARPOL 73/78;
- Category A and B cargo residues from the carriage of liquid noxious substances in bulk, cf. Regulation 5 of Annex IV to the 1974 Helsinki Convention and Regulation 5 of Annex II of MARPOL 73/78; and
- Garbage, other than food wastes, cf. Regulation 8 of Annex IV to the 1974 Helsinki Convention and Regulation 5, Paragraph 2(a) of Annex V of MARPOL 73/78.

This obligation of mandatory delivery has some exemptions: thus minor amounts of wastes need not be delivered, special arrangements may be needed for *e.g.* passenger ferries in short voyages, and in case of inadequate port reception facilities the ship has the right to await the delivery to next port of call.

- operation of port reception facilities

Ports' waste management plans should be developed, with the overall aim that each port should determine which facilities need to be provided. Furthermore, the aims of the plans are to specify the handling of wastes from the collection until the final disposal, and to designate a person in charge of implementing the plan, as well as to inform visiting ships about the waste discharge procedures and arrangements (HELCOM Recommendation 19/12).

Ships should notify 24 hours in advance of the use of a port reception facility, stating the amount of wastes to be discharged, including the amount of wastes delivered in last port of call. Additionally the capacity of the waste storage tanks/bins on board should be stated (HELCOM Recommendation 19/11).

A 'no-special-fee' system should be used when charging for the operation of port reception facilities, including the handling and final disposal of ship-generated wastes. According to this system a fee will be levied on the ship regardless of the actual delivery of ship-generated wastes to the port reception facility. Thus, for the ship this should be the incentive to deliver wastes at reception facilities rather than discharge it illegally into the sea (HELCOM Recommendation 19/8). To begin with the system should be applied to the delivery of oily-wastes from machinery spaces of ships.

- *prosecution of offenders*

To further make ships abstain from discharging illegally the Baltic Sea States have decided on harmonising administrative fines in case of violations of anti-pollution regulations by deciding on a minimum level (HELCOM Recommendation 19/14).

Moreover, in case of illegal discharges the Baltic Sea States have stressed the importance of enhancing the co-operation among them to ensure successful convictions of offenders. To achieve this an extensive Legal Manual is under elaboration dealing with the anti-pollution regulations at sea and the prosecution of offenders thereof in each of the Baltic Sea States. Parallel with the Legal Manual 'Guidelines on ensuring successful conviction of offenders' are being elaborated, extracting in a more operator-friendly and concentrated manner the essence of the Legal Manual.

- *environmentally sound waste management*

Guidelines concerning ashore handling of wastes have been decided on to ensure the proper reception and treatment of wastes. The desirability of integrating the treatment and final disposal of ship-generated wastes with existing land treatment systems is stressed (HELCOM Recommendation 19/13).

- *regulations for ships not covered by the existing anti-pollution regulations*

Last but not least the Baltic Sea States have decided that ships less than 400 tonnes gross tonnage should comply with the principles concerning holding tanks/oily water separating equipment (HELCOM Recommendation 19/10). Furthermore, fishing vessels, working vessels and pleasure craft, which have onboard a toilet, shall be provided with toilet retention systems and standards connections for sewage. These ships shall also have onboard garbage retention appliances (HELCOM Recommendation 19/9).

JOINT CONCERN: RELATED TO PROBLEMS SUCH AS USE OF ANTI-FOULING PAINTS CONTAINING TBT AND INTRODUCTION OF HARMFUL AQUATIC ORGANISMS

Further impacts related to maritime transport are related to the use of antifouling paints containing TBT and the introduction of harmful aquatic organisms through discharge of ballast water. The hazardous impacts to the environment from the use of antifouling products containing TBT are well known. Awareness of the problems related to the introduction of harmful aquatic organisms has arisen over the years. Within the Baltic Sea Area there are several examples of species which have successfully colonised parts of the Baltic Sea Area, *e.g.*, among fish *Neogabias* in the Bay of Gdansk and among macro-algae *Sarggassben* in the southern part of the Baltic Sea.

JOINT SOLUTION : TO EVENTUALLY PHASE OUT THE USE OF ANTI-FOULING PAINTS CONTAINING TBT AND TO REGULATE THE DISCHARGE OF BALLAST WATER TO HINDER THE INTRODUCTION OF HARMFUL AQUATIC ORGANISMS

The issue of antifouling paints containing TBT has been addressed through HELCOM Recommendation 20/4. In accordance herewith the Baltic Sea States are recommended not to use such paints on pleasure craft (and on fish net cages), as well as to consider to extend this prohibition also to, *e.g.*, sea-going ships. A reporting format is attached to the Recommendation in which the Baltic Sea States should report on the national implementation, on less harmful substitutes used, as well as on results of monitoring of concentration of TBT in the marine environment. It should be mentioned that when the Convention on the Protection of the Marine Environment of the Baltic Sea Area from 1992 (the 1992 Helsinki Convention) enters into force the prohibition on the use of such paints on pleasure craft not exceeding 25 metres in length (and fish net cages) will be an integral part of the Convention, cf. Regulation 2.3 of Part 2 of Annex I to the 1992 Helsinki Convention.

Acknowledging that the effectiveness of measures taken regarding other sea-going ships depend on their global application the Baltic Sea States have worked jointly within the IMO to achieve a ban on the use of antifouling paints containing TBT and eventually the phase out of the presence of such paints on ships. Political agreement has been reached to ban the use from 1 January 2003 and to ban the presence from 1 January 2008 - the content and the form of the legal instruments now having to be decided on.

As concerns the introduction of harmful aquatic organisms through discharge of ballast water two regional projects have been initiated within the Baltic Sea Area: a HELCOM Project will investigate the extent to which alien species are introduced in the Baltic Sea Area and elaborate a database, and a World Bank Project founded by the Global Environmental Facility (GEF), which will, *inter alia*, deal with the issue of alien species.

To be effective the measures taken to deal with the introduction of harmful aquatic organisms likewise have to be taken on a global level and, in addition to a regional approach, the Baltic Sea States will have to promote a joint approach within the IMO.

JOINT CONCERN: THE INCREASED OIL HANDLING CAPACITY AND OIL TRANSPORTATION

Recent inventories on 'oil handling in the Baltic Sea Area, 1996 - 2001' (1998) and on 'transportation patterns and risk estimation of oils carried in the Baltic Sea Area' (1996) show that if plans to enlarge the existing and to build new oil terminals are fulfilled and capacities are utilised, the oil transportation in the Baltic Sea Area is estimated to increase from 77,4 million tonnes of oil (1995) to about 177 million tonnes. This increase will likewise affect the estimated number of oil spill accidents from 2,87 to 4,86 accidents per year, which again will affect an increase in the

statistical oil spill quantity from 645 tonnes to 1 475 tonnes per year. The 1995 figures have been indicated on maps showing the estimated quantity of oils transported and handled in harbours, numbers of journeys and harbour calls and risk estimations, cf. Annexes 3-5. For the year 2001 maps have been elaborated to show the estimated handled quantities of oils as well as oil handling capacities, cf. Annexes 6-7.

These inventories also reveal that the share between crude oil/relatively light oil products and heavy fuel oils/persistent oil products are about 86 % to 13 %, which when presented in total number of tanker journeys makes the share 77 % to 23 %. Furthermore, the inventories display that a majority, *i.e.*, 65 %, of the transportation takes place in small oil tankers with a capacity of less than 10 000 m^3 and that one third of the oil is transported in single-hull tankers.

JOINT SOLUTION: TO DECREASE RISKS FROM THE INCREASED OIL HANDLING CAPACITY AND OIL TRANSPORTATION

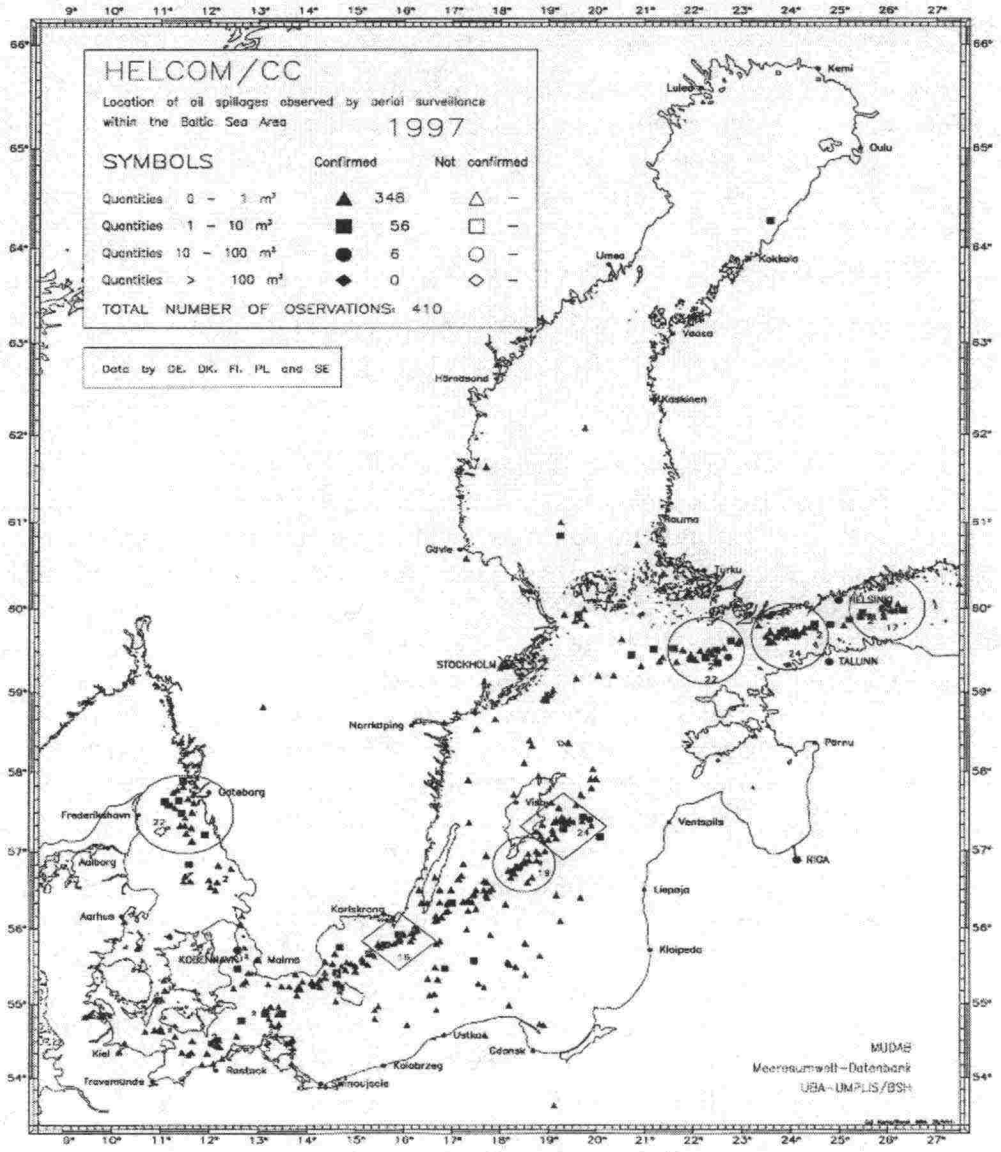
The Baltic Sea States have already decided on detailed measures in order to be able to fulfill their obligations under the Helsinki Convention to ensure a swift national and trans-national response to pollution incidents at sea threatening the marine environment of the Baltic Sea Area. These measures include the readiness of response units; their ability to reach and start combatting spillages, the combatting means to be used, and in what manner to report and notify about pollution incidents as well as to call for assistance from other Baltic Sea States. To ensure co-operation in case of real incidents the Baltic Sea States arrange operational exercises on a regular basis, hereby testing the pollution reporting system, training the staff and trying out the co-operation between different national combatting units. Further the Baltic Sea States have developed regular aerial surveillance activities including both national surveillance in own response regions and joint surveillance covering the whole Baltic Sea Area as well as busy shipping routes, cf. Annexes 2 and 4 for the locations and numbers of observations made during such surveillance activities.

To minimise the risk for and the consequences of an oil spill during oil tanker operations in oil terminals the Baltic Sea States have recently adopted HELCOM Recommendation 20/5 addressing the need for contingency planning and pollution response equipment in the oil terminals.

Further it has been decided that ships carrying dangerous or polluting goods should report on what they carry before departure from / arrival in a port located in a Baltic Sea State (HELCOM Recommendation 19/15).

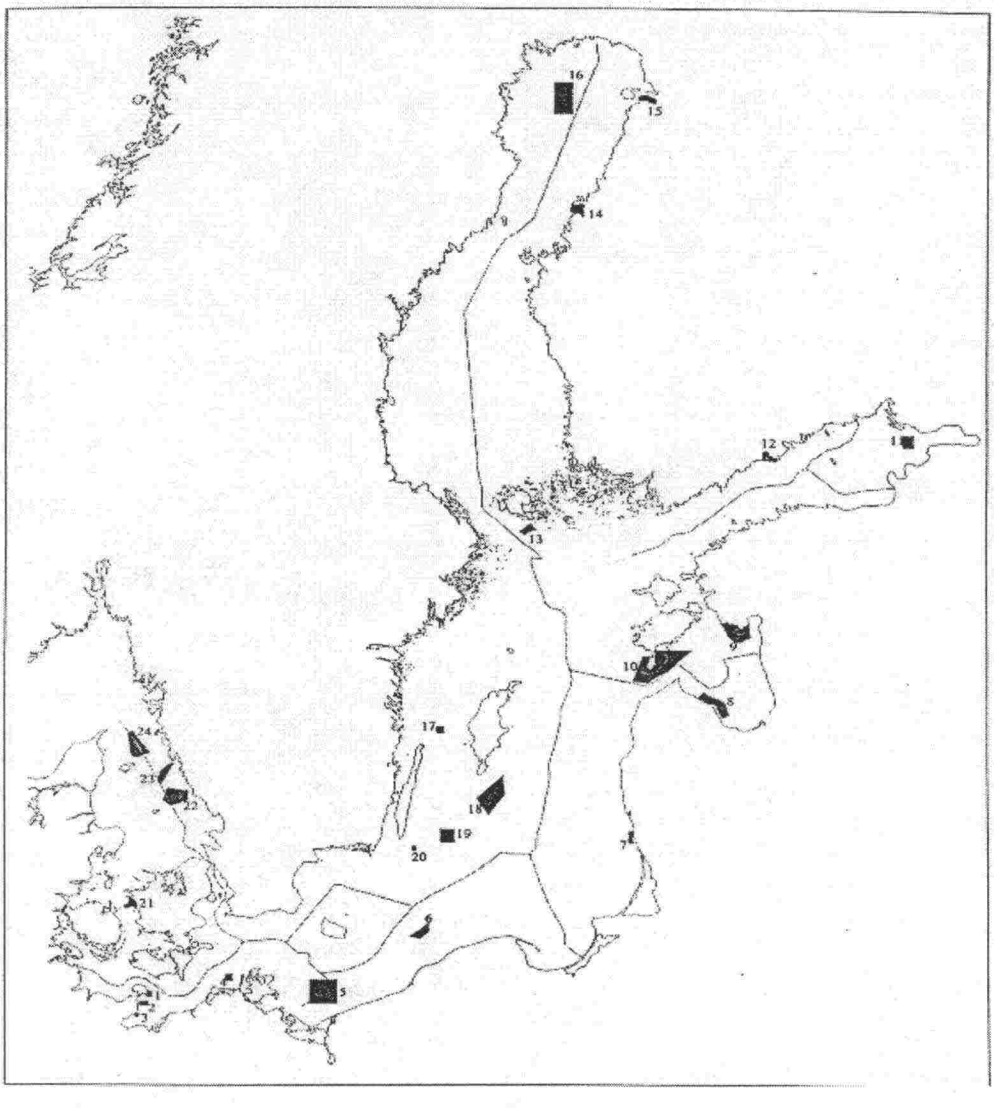
A matter for consideration at the next meeting of maritime experts is whether and how to make an earlier phase out of the use of single-hull tankers than what has been agreed internationally. This is an important issue taking into account that groundings and collisions are the main risks of accidents causing oil spills.

Annex 1.


HELCOM/CC
Location of oil spillages observed by aerial surveillance within the Baltic Sea Area
1997
SYMBOLS
Confirmed
Not confirmed
Quantities 0 - 1 m³ 348 -
Quantities 1 - 10 m³ 56 -
Quantities 10 - 100 m³ 6 -
Quantities > 100 m³ 0 -
TOTAL NUMBER OF OSERVATIONS: 410
Data by DE, DK, FI, PL and SE
Kemi
Luleå
Oulu
Umea
Kokkola
Vaasa
Härnösand
Kaskinen
Gävle
Turku
HELSINKI
TALLINN
STOCKHOLM
Norrköping
Pärnu
Ventspils
RIGA
Liepaja
Klaipeda
Göteborg
Frederikshavn
Aalborg
Aarhus
Karlskrona
Malmö
Kiel
Travemünde
Rostock
Ustka
Gdansk
Kolobrzeg
Swinoujscie
MUDAB
Meeresumwelt-Datenbank
UBA-UMPLIS/BSH

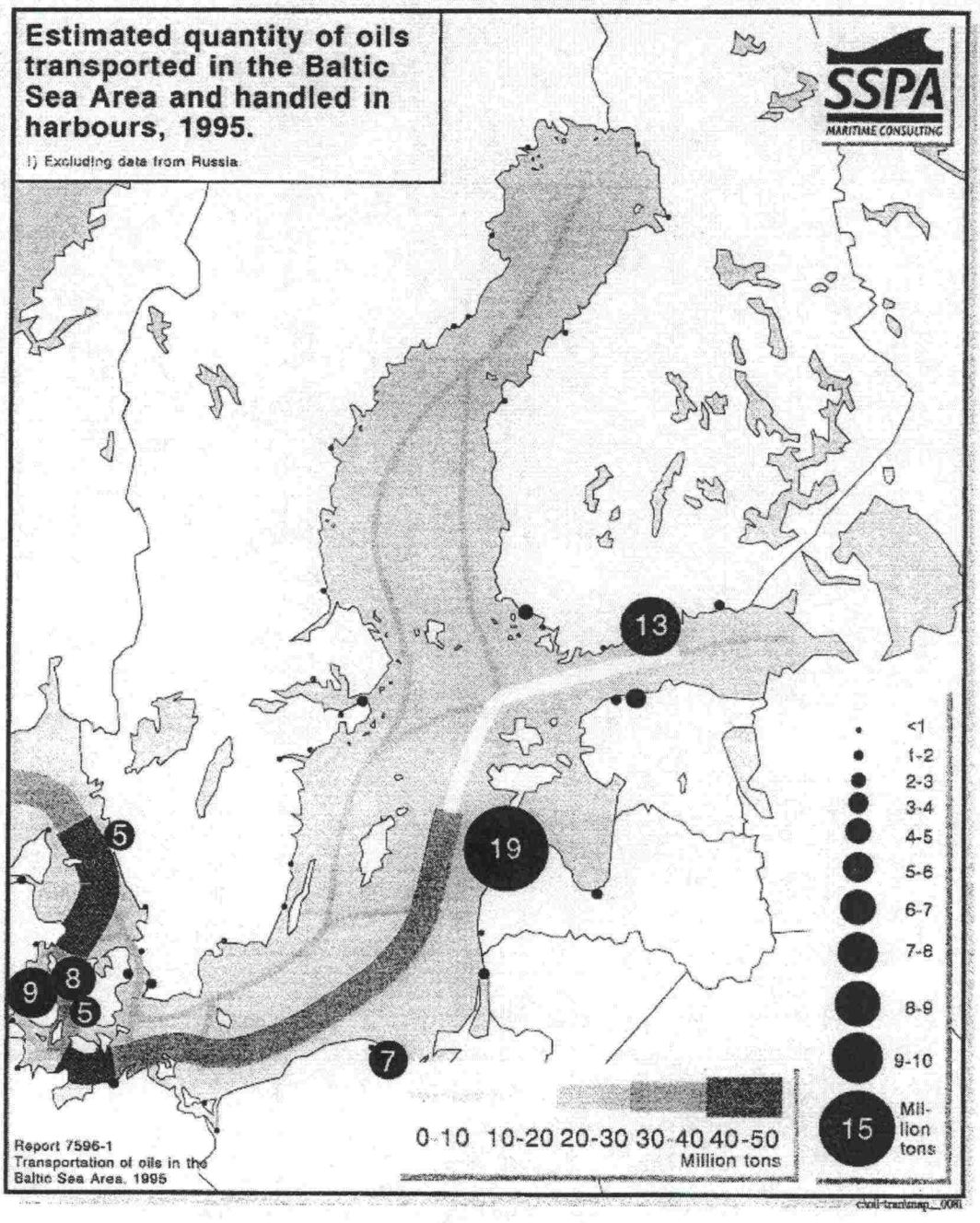
Annex 2.

Location of proposed new Baltic Sea Protected Areas (BSPAs) and EEZ borders:



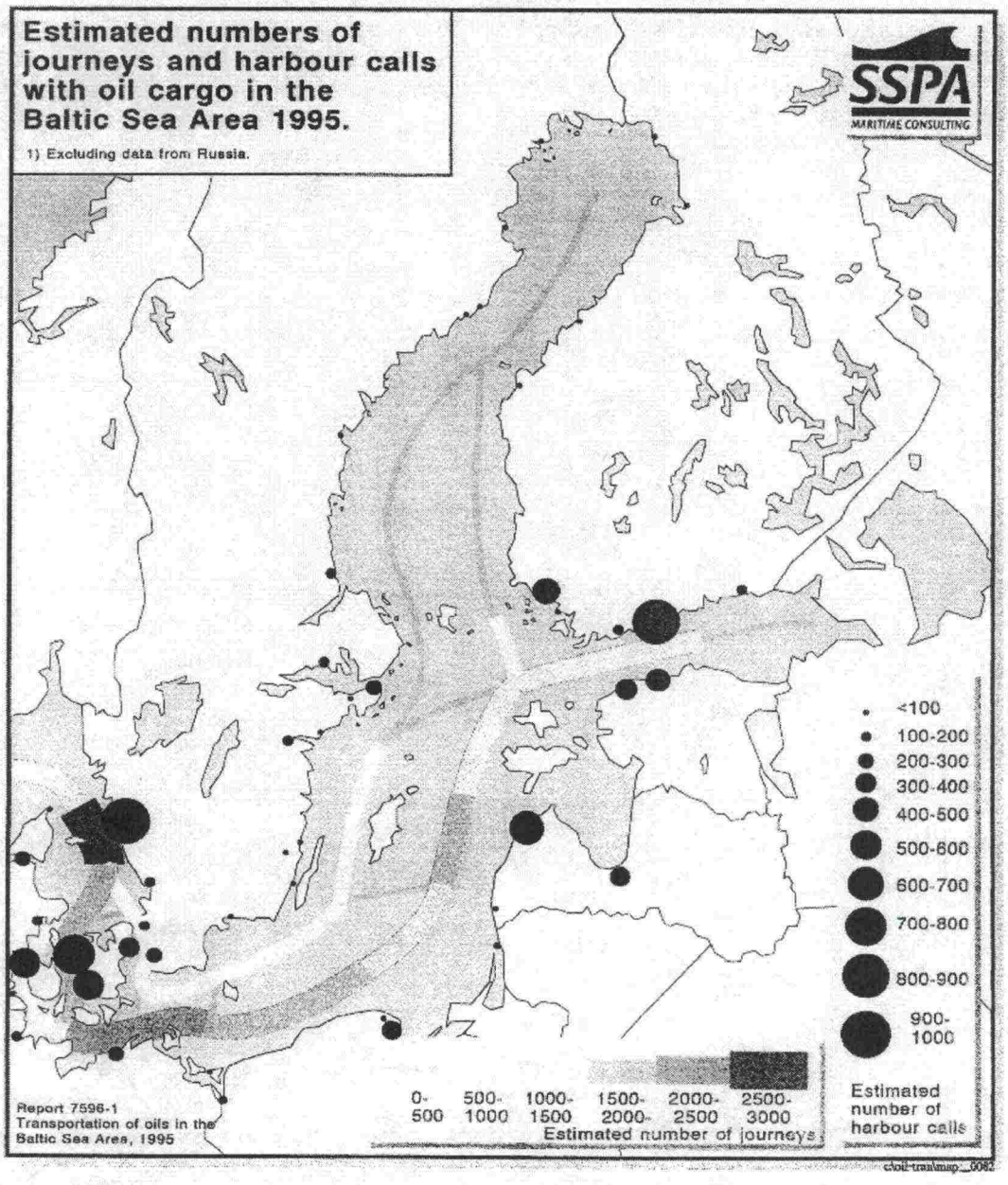
Reference: Bertil Hägerhäll, Ardea Miljö AB & Henrik Skov, Ornis Consult, A/S: Proposal for offshore Baltic Sea Protected Areas (BSPAs), Expert Report to EC NATURE; September 1998.

Annex 3.



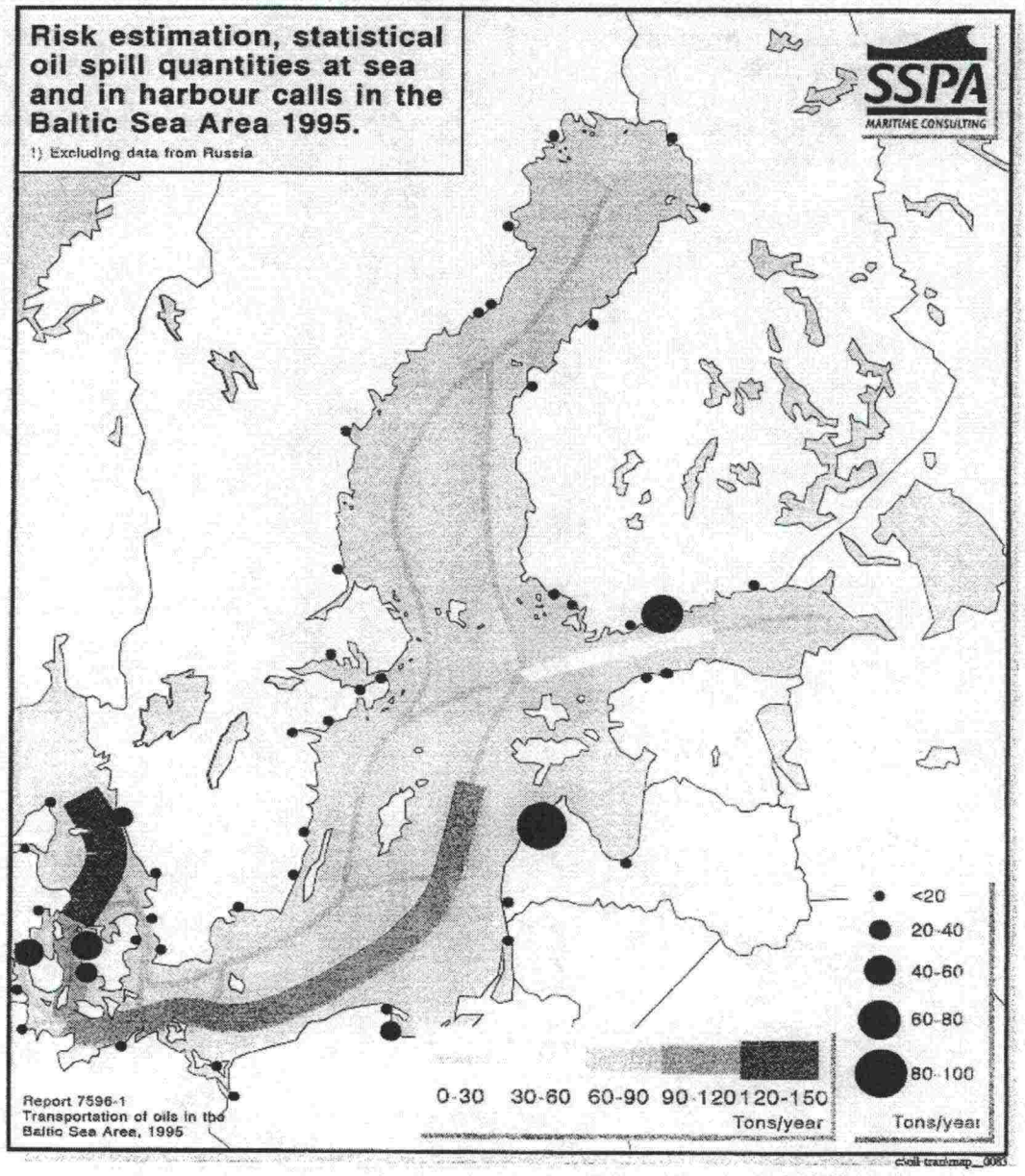
Reference: SSPA Maritime Consulting AB (1996): Transportation of oils in the Baltic Sea Area 1995.

Annex 4.



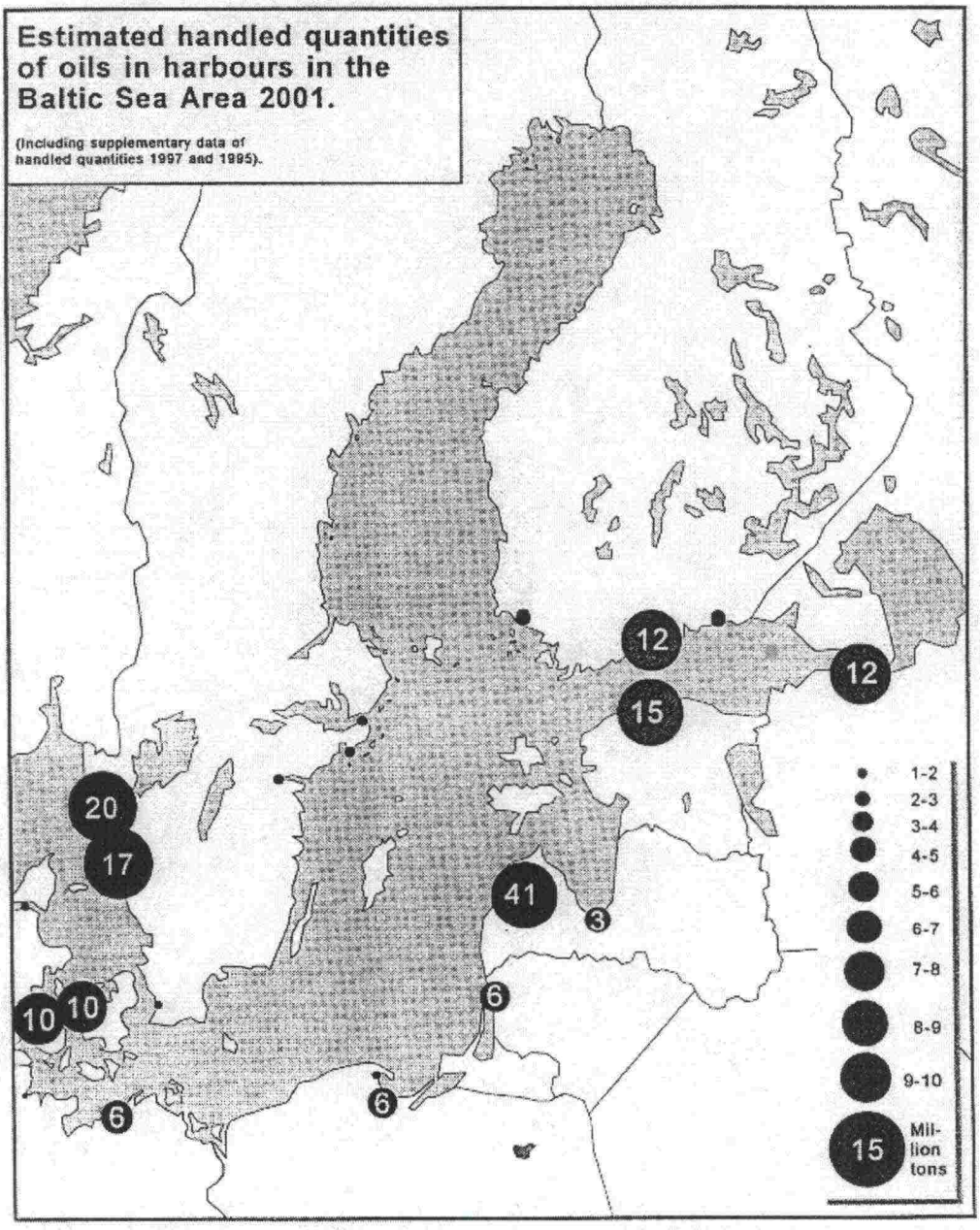
Reference: SSPA Maritime Consulting AB (1996): Transportation of oils in the Baltic Sea Area 1995.

Annex 5.



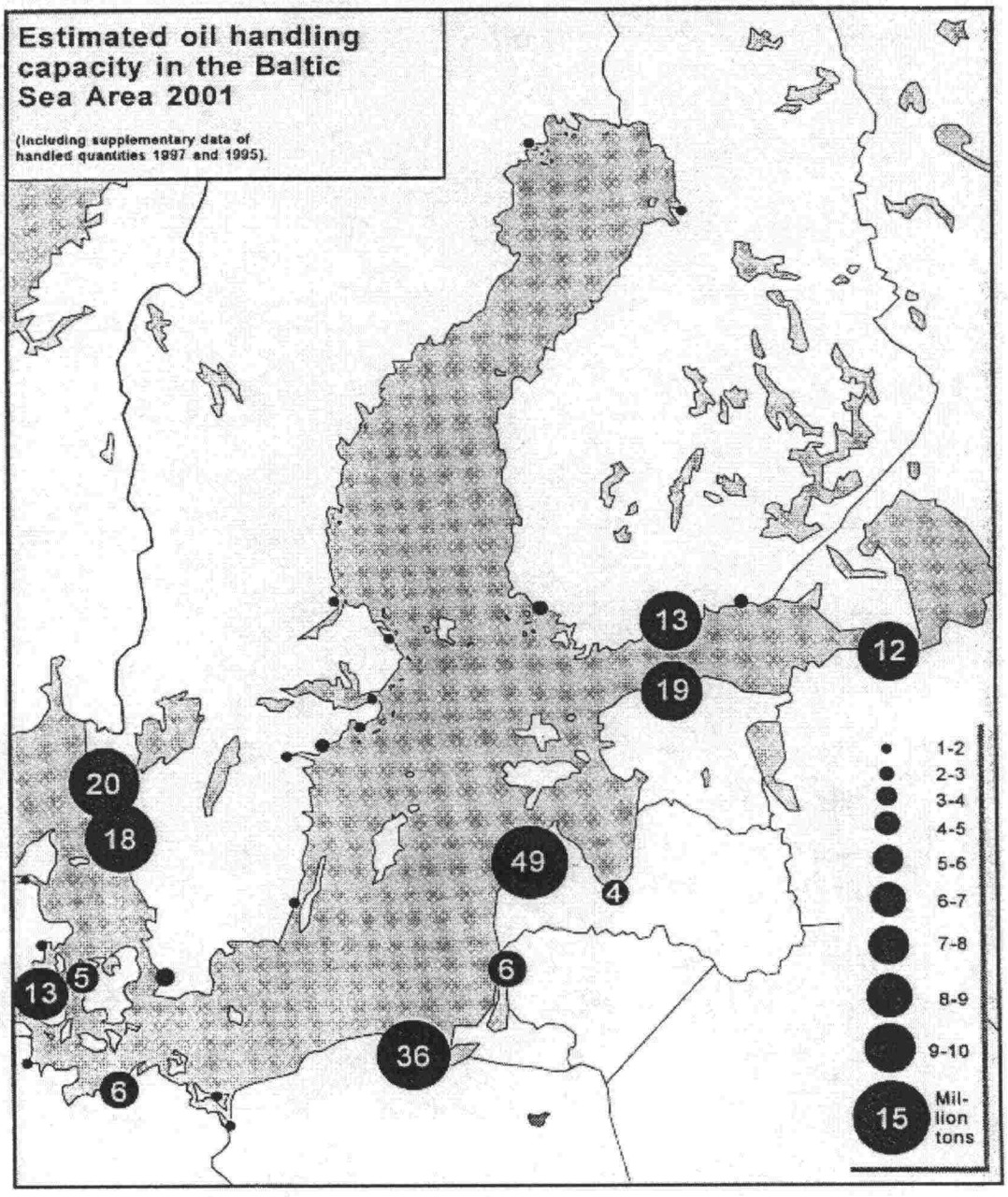
Reference: SSPA Maritime Consulting AB (1996): Transportation of oils in the Baltic Sea Area 1995.

Annex 6.



Reference: SSPA Maritime Consulting AB (1998): *Oil handling in the Baltic Sea Area, 1996 – 2001.* Report No 7935-2, author Karin Magnusson.

Annex 7.



Reference: SSPA Maritime Consulting AB (1998): *Oil handling in the Baltic Sea Area, 1996 – 2001.* Report No 7935-2, author Karin Magnusson.

Mr. Valery M. Zaitsev
Head of the Special Inspection for Protection of
Sea and Connected Waterways of the State Committee
for Protection of Environment of St. Petersburg and Leningrad region

RUSSIA'S ENVIRONMENTAL POLICY IN 2000

Dear colleagues, I'm glad to greet you all assembled in this hall. First of all, allow me to thank the organisers of this seminar for the possibility to meet the specialists in questions concerning protection of sea. I'd also like to use the opportunity to encourage Russian colleagues, coming from far away, to discuss problems of sea basins and ecosystem.

Economic activity in coastal states of the Baltic Sea and other seas of Russia has created big problems with pollution of the sea environment. To solve this problem we, above all, have to do a great deal in order to modernise our ecological legislation and bring it to similarity with approved international acts.

This is particularly important because our government has subscribed an agreement with the European Union on realisation of the concept of the Northern aspect in northern and north-eastern territories presupposing an intensive utilisation of natural resources of this area.

The north-western zone of Russia and, first of all, St. Petersburg and Leningrad region, where the main sea and river communications connecting Russia to the EU are located, will be areas of the greatest interest for Russia and the EU.

Construction of new port complexes, oil conduit lines, new transportation routes and organisation of industrial zones in the coastal territories of the Baltic Sea and their infrastructure will bring along a threat of considerable growth of burden to its ecosystem.

During the past decade a great deal has been done for improvement of the water of the Baltic Sea. The countries which undersigned the Helsinki convention, revised in 1992, achieved, by following HELCOM recommendations, a considerable decrease of the load of land-based sources from the surrounding water collecting area.

Nevertheless, eutrophication and pollution are still serious problems for the Baltic Sea. These problems are getting worse due to increasing pollution caused by oil products and other substances connected with the intensification of shipping activities.

Russia's politics in protection of the sea environment is, within realisation of the EU concept of Northern aspect, directed to collaboration of the economics in protection of the nature, including the sea environment. Co-operation within the framework of the Northern aspect has to be based on the principles of continuous development and guaranteed ecological safety.

These conditions were also brought out during the appearance of the first deputy minister for foreign affairs of Russia Mr. A.A. Avdejev in the Vienna summit in March 1999. In June there was a seminar in St. Petersburg where representatives of the EU, the Baltic Sea states and nature conservation organs of the northern and north-western territories were represented. Adopted recommendations especially emphasise the importance of connecting the Protection of the Sea Environment in all measures to be taken within the Northern aspect.

I think that it will be useful for us to prepare general approaches to the Protection of the Sea Environment, especially when new port complexes are being constructed. Considering that protection of the sea environment concerning ports was studied in 1993-94 but these ports have not yet been built. If construction works should really be executed, there would be a new approach to protection of the sea environment taking into account the regulations of the EU.

Besides, development of ports and growth of transportation volumes are increasing the risk of accidents and oil spillage. Here it is of the highest importance to create a transboundary co-operation organisation for the Baltic Sea states. (This question will be clarified in detail by Mr. Kalenichenko from the Special Service for Liquidation of Oil Product Spillage in St. Petersburg).

In conclusion I want to say that only with united efforts we can solve the problems within the protection of the sea environment of our Baltic Sea. For our part we try to solve them as efficiently as possible, with maximum of our capacity.

Thank you for your attention. Allow me to wish that your work in this seminar will be successful.

Pavel Reivart
Head of the Sea Law Dept of the Russian Marine Fleet (Rosmorflot), Russia

ORGANIZATIONAL STRUCTURE, PRESENT STATE AND PROSPECTS FOR THE FUTURE OF SEA PORTS IN THE RUSSIAN FEDERATION

The Merchant Shipping Code of the Russian Federation, in force since the 1st of May 1999, contains the general definition and classification of the Russian sea ports.

In accordance with the Merchant Shipping Code of the Russian Federation (Article 9), the concept 'sea port' means a system of constructions located on a specially disposed territory and water area intended for ship-servicing purposes. Depending on the purpose of ships (ships for merchant shipping or fishing fleet), sea ports are divided, correspondingly, into marine merchant and marine fishing ports. In addition, there are specialized sea ports, intended for serving ships transporting specified cargoes (timber, oil, etc.).

This lecture also deals with sea merchant ports included in the transport system of the Russian Federation.

As known, all sea ports in the Soviet Union had a status of state-owned enterprises. At present, in accordance with the valid legislation of the Russian Federation, all Russian commercial sea ports can be divided into two groups with regard to their organizational and legal form:

1. Ports which retained the status of state-owned enterprise.

These are generally small ports located in the North and North-East parts of Russia, having a short navigational season and a low rate of turnover. As a rule, these ports are intended for the transportation of oil (carbon and oil products) as well as products necessary for maintaining the vital functions of population in nearby territories. This kind of ports (undertakings) are subordinated directly to the Transport Ministry of the Russian Federation. In their activities they follow the general regulations of the civil legislation which regulates the activities of state-owned unitary enterprises, charter documents (regulations or by-laws) as well as directions from the Russian Transport Ministry (Rosmorflot). In other words, there have not been any fundamental changes in the activities of the mentioned ports compared to the Soviet period.

2. Ports that have gone through the privatization procedure, as a result of which the state-owned ports/enterprises have ceased to exist. On the property basis of these enterprises, companies in form of joint companies performing loading and unloading operations and serving of ships have been created. These companies follow in their activities the general regulations of the civil legislation which regulates the operation of joint companies, the more detailed federational law 'About joint companies', the

legislation of the Russian Federation of privatization as well as the normative legal acts of the Russian Transport Ministry which are published within the competency of the Ministry concerning the State regulation of the activities of sea transports in Russia.

A list on property not subject to privatization which can only be a property of the Federation has been specified on the basis of the legislation on privatization. This applies, above all, to hydrotechnical installations (piers, jetties, breakwaters) as well as property and objects ensuring the safety in shipping. In order to ensure the protection of the mentioned state-owned property, inspection of its safe technical operation and control of its proper use as well as keeping it in working order in the ports included in the second group, state institutions, i.e. Sea Port Administrations, have been created under the Transport Ministry of Russia. Another basic task of the Sea Port Administration is to ensure the safety of shipping and order in ports. These activities are directly attended by the port captain, who is included in the Sea Port Administration.

Consequently, the port activities of the second group ports, as the object of sea transportation is a combination of commercial subjects having a different organizational and legal form. Among these subjects, the Sea Port Administration has a particular role, because it has administrative and authoritative rights as well as other rights given to it by the Government of the Russian Federation (The Merchant Shipping Code of the Russian Federation, Section 4, Article 9). At the same time, the activities of the Sea Port Administration are not regulated practically at a legislational level, except of the general regulations of the civil legislation related to any governmental institution.

In contradiction to the Merchant Shipping Code of the Soviet Union which had a separate paragraph regulating all sides of sea ports, the Merchant Shipping Code of the Russian Federation sufficiently detailed regulates only the functions and authorities of the sea port captain in order to ensure the safety of shipping and order in port (Section V of the Merchant Shipping Code of the Russian Federation). As regards all other parties of activities of sea ports, the Merchant Shipping Code of the Russian Federation (Section 5, Article 9) refers to the Law on Sea Ports of the Russian Federation. The project planning of the mentioned law is just now at the completion stage, and there is reason to assume that the law will be accepted at the beginning of the year 2000.

The project planners of the Law on Sea Ports have run into the need for a statutory regulation of complicated problems, existing nowadays in the activities of Russian sea ports. Above all, this relates to the second group of ports, i.e. privatized ports as well as to new ports being built with the participation of private investors.

For example, in case of a port of this kind, a question arises about the specification of the proper concept 'port': What does it mean? It seems that in the specification "system of installations" given by the Merchant Shipping Code of the Russian Federation there is no organizational or legal part specifying the port as one entire object of sea transports. It is clear that a ship does not arrive in a 'system of installations' or the stevedoring company 'Ivanov & Co.' (the latter is related to the fact that among many people the name of, for example, the stock company 'St. Petersburg Commercial Sea Port' is associated from old time with the port of St. Petersburg. This is not the same).

Lately, a concept that a 'port' is above all a sea administration of the port being a port authority and an axis around which all port activities are performed spreads out in Rosmorflot. The opponents of such an idea say that if this point of view was reflected in the Law on Sea Ports, it will then be a law on Sea Port Administrations. At the same time there is a proposal to specify by law, above all, the production activities of the port, while the role of the Sea Port Administration is included in functions and authorities of the port captain. It seems that both these opinions are extreme viewpoints for the problem, but the truth in such cases lies normally in the golden mean. In other words, the law shall sufficiently clearly specify both the production activities of a port including all functions linked with it and the role, functions and authorities of sea administrations as regards the state regulation of port activities.

Another important problem which seems to be necessary to be solved on a legislation basis in the Law on Sea Ports and when accepting it are the private investments for ports under construction. This problem is related to the fact, as mentioned above, that according to the Russian legislation, a part of the port's property and objects can be included only in the state federational property.

And still I would like to point out one problem which is directly linked with the theme of our seminar. This is the question concerning environmental protection, contamination prevention and prevention of consequences of contamination both in the water basins of sea ports and sea water outside the ports. In the transport system of the Russian Federation the mentioned functions have been given, above all, to a specialized institution at the Transport Ministry of Russia, to the State Emergency Rescue Service and specialized subdepartments, emergency rescue direction of the water basin, following in their activities an environmentally friendly legislation as well as corresponding international conventions in which the Russian Federation participates.

However, at the present becomes indisputable the necessity to regulate by law that Sea Port Administrations and other economical subjects performing the activities in sea ports shall participate in the mentioned environmental protection activities.

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ENVIRONMENTAL RULES AND CONVENTIONS

Since the Second World War marine pollution has been a growing concern to coastal states. Dumping of wastes generated on land or on ships into the sea used to be a common way to get rid of wastes. During the past decades a number of conventions have been adopted and ratified in order to protect the marine environment. The most important global conventions related to marine pollution prevention are given on the table below.

Table 1. Global conventions related to marine pollution prevention and combating oil pollution.

Convention	Abbreviation	Status
International Convention for the Prevention of Pollution of the Sea by Oil, 1954	OILPOL (1954)	Superseded by MARPOL 73/78
International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969	INTERVENTION 1969	Entry into force 6 May 1975
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972	LC 1972	Entry into force 30 August 1975
International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto	MARPOL 73/78	Entry into force 2 October 1983
International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990	OPRC 1990	Entry into force 13 May 1995

In addition to the global conventions there are several regional conventions related to marine pollution prevention. Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1974 (Helsinki Convention) is one of the first regional conventions.

On the following pages the most important conventions related to marine pollution prevention from ships are discussed. The first global convention was the 1954 Oil Pollution Convention, which was later superseded by the MARPOL 73/78 Convention. Annex IV of the Helsinki Convention is very important for the protection of the marine environment from ships in the Baltic Sea Area.

Many of the Baltic Sea States are members of the European Union and thus also the EU legislation has a growing importance for the protection of the Baltic Sea Area. Finally the Finnish legislation related to the protection of the marine environment from pollution from ships is presented.

1. The 1954 Oil Pollution Convention

Oil pollution of the sea - especially in ports and harbours - was first recognised as a problem before the First World War and, during the 1920s and 1930s, various countries introduced measures to control discharges of oil within their territorial waters and provide deterrents in the form of fines for illegal discharges. International measures were considered, but no agreement had been reached before the outbreak of the Second World War.

By the early 1950s, so much oil was being transported by sea that there was growing concern about the danger of marine pollution. In 1954, the United Kingdom organised a conference on the subject which resulted in the adoption of the International Convention for the Prevention of Pollution of the Sea by Oil. Following entry into force of the IMO Convention in 1958, the depository and Secretariat functions in relation to the Convention were transferred from the United Kingdom Government to IMO.

Although pollution resulting from tanker accidents was beginning to cause some concern, this Convention was primarily aimed at pollution resulting from routine tanker operations and from the discharge of oily wastes from machinery spaces, which were regarded as the major causes of oil pollution from ships.

When a tanker discharged its cargo it had to fill some of its cargo tanks with ballast water in order to provide the necessary sea-keeping stability and to ensure that the propeller and rudder were properly immersed for the voyage back to the loading port. As a certain amount of cargo oil was left clinging to the tank walls and bottom, this ballast water became contaminated with oil, and its discharge into the sea caused pollution.

Mixtures of oil and water were also generated by washing the cargo tank walls and bottom with high pressure water jets. Prior to 1954 the normal practice was to pump these mixtures of oil and water and oily residues directly into the sea.

The 1954 OILPOL Convention attempted to tackle the problem of pollution of the seas by oil in two main ways:

1. it established 'prohibited zones' extending at least 50 miles from the nearest land in which the discharge of oil or of mixtures containing more than 100 parts of oil per million was forbidden; and
2. it also required Contracting Parties to take all appropriate steps to promote the provision of facilities for the reception of oily water and residues.

In 1962, IMO adopted amendments to the Convention which extended its application to ships of a lower tonnage and also extended the 'prohibited zones'. Further amendments were adopted in 1969, as a result of which the operational discharge of oil was restricted in the following ways:

For oil tankers:

Operational discharges of oil from tankers are allowed only when all of the following conditions are met:

1. the total quantity of oil which a tanker may discharge in any ballast voyage whilst under way must not exceed 1/15,000 of the total cargo carrying capacity of the vessel;
2. the rate at which oil may be discharged must not exceed 60 litres per mile travelled by the ship; and
3. no discharge of any oil whatsoever must be made from the cargo spaces of a tanker within 50 miles of the nearest land.

A new form of oil record book is required, in which is recorded the movement of cargo oil and its residues from loading to discharging on a tank-to-tank basis.

For machinery spaces of all ships:

The discharge from machinery space bilges is allowed only when all of the following conditions are met:

1. the rate at which oil may be discharged whilst the ship is under way must not exceed 60 litres per mile being travelled by the ship;
2. the oil content of any bilge water discharged must be below 100 parts per million; and
3. discharge must be made as far as practicable from land.

In 1971, further amendments were adopted which afforded additional protection to the Great Barrier Reef of Australia and also limited the size of tanks on oil tankers, thereby minimising the amount of oil which could escape in the event of a collision or stranding.

2. The MARPOL Convention

The enormous growth in the maritime transport of oil and the size of tankers, the increasing amount of chemicals being carried at sea and a growing concern for the world's environment as a whole made many countries feel that the 1954 OILPOL Convention was no longer adequate, despite the various amendments which had been adopted.

In 1969, the IMO Assembly - inspired partly by the Torrey Canyon disaster of two years before - decided to convene an international conference to adopt a completely new convention. The conference met in London in 1973.

The Convention which was adopted is the most ambitious international treaty covering maritime pollution ever adopted. It deals not only with oil, but with all forms of marine pollution except the disposal of land-generated waste into the sea by dumping (which was covered by another convention adopted the previous year).

Most of the technical measures are included in five annexes to the Convention which deal respectively with the following:

Annex I	Oil
Annex II	Noxious liquid substances carried in bulk (e.g. chemicals)
Annex III	Harmful substances carried in packages (e.g. tanks and containers)
Annex IV	Sewage
Annex V	Garbage

2.1 Annex I: Prevention of pollution by oil

Entry into force: 2 October 1983.

The Convention maintains the oil discharge criteria prescribed in the 1969 amendments to the 1954 Oil Pollution Convention (see above), without substantial changes, except that the maximum quantity of oil which is permitted to be discharged on a ballast voyage of new oil tankers has been reduced from 1/15 000 of the cargo capacity to 1/30 000 of the amount of cargo carried. These criteria apply equally both to persistent (black) and non-persistent (white) oils.

A new and important feature of the 1973 Convention is the concept of 'special areas' which are considered to be so vulnerable to pollution by oil that oil discharges within them have been completely prohibited, with minor and well-defined exceptions. The main special areas are the Mediterranean Sea, the Black Sea, the Baltic Sea, the Red Sea and the Gulfs area.

All oil-carrying ships are required to be capable of operating the method of retaining oily wastes on board through the 'load on top' system or for discharge to shore reception facilities.

This involves the fitting of appropriate equipment, including an oil-discharge monitoring and control system, oily-water separating equipment and a filtering system, slop tanks, sludge tanks, piping and pumping arrangements.

New oil tankers (i.e. those for which the building contract was placed after 31 December 1975) of 70 000 tons dead weight and above, must be fitted with segregated ballast tanks large enough to provide adequate operating draught without the need to carry ballast water in cargo oil tanks.

Secondly, new oil tankers are required to meet certain subdivision and damage stability requirements so that, in any loading conditions, they can survive after damage by collision or stranding.

2.2 Annex II: Control of pollution by noxious liquid substances

Entry into force: 6 April 1987

Annex II details the discharge criteria and measures for the control of pollution by noxious liquid substances carried in bulk.

Some 250 substances were evaluated and included in the list appended to the Convention. The discharge of their residues is allowed only to reception facilities until certain concentrations and conditions (which vary with the category of substances) are complied with. In any case, no discharge of residues containing noxious substances is permitted within 12 miles of the nearest land. More stringent restrictions apply to the Baltic and Black Sea areas.

2.3 Annex III: Prevention of pollution by harmful substances carried in packaged form, or in freight containers or portable tanks or road and rail tank wagons

Entry into force: 1 July 1992.

This is the first of the convention's optional annexes. States ratifying the Convention must accept Annexes I and II but can choose not to accept the other three - hence they have taken much longer to enter into force.

Annex III contains general requirements for the issuing of detailed standards on packing, marking, labelling, documentation, stowage, quantity limitations, exceptions and notifications for preventing pollution by harmful substances. The International Maritime Dangerous Goods (IMDG) Code has, since 1991, included marine pollutants.

2.4 Annex IV: Prevention of pollution by sewage

Entry into force: 12 months after being ratified by 15 States whose combined fleets of merchant shipping constitute at least 50 % of the world fleet.

Status: The Annex has been accepted by 73 States whose fleets represent 42,59 % of world tonnage

The second of the three optional Annexes, these contain requirements to control pollution of the sea by sewage.

2.5 Annex V: Garbage

Entry into force: 31 December 1988.

This deals with different types of garbage and specifies the distances from land and the manner in which they may be disposed of. The requirements are much stricter in a number of 'special areas' but perhaps the most important feature of the Annex is the complete ban imposed on the dumping into the sea of all forms of plastic.

2.6 The Protocol of 1978

Adoption: 17 February 1978.
Entry into force: 2 October 1983.

The International Conference on Tanker Safety and Pollution Prevention held from 6 to 17 February 1978, resulted in the adoption of a number of important measures, including Protocols to SOLAS, 1974. The Conference decided that the SOLAS Protocol should be a separate instrument, and should enter into force after the parent convention.

In the case of MARPOL, however, the Conference adopted a different approach. At that time the principal problems preventing early ratification of the MARPOL Convention were those associated with Annex II.

The changes envisaged by the Conference involved mainly Annex I and it was therefore decided to adopt the agreed changes - and at the same time to allow Contracting States to defer implementation of Annex II for three years after the date of entry into force of the Protocol (i.e. until 2 October 1986). By then it was expected that the technical problems would have been solved.

The Protocol makes a number of changes to Annex I of the parent convention. Segregated ballast tanks (SBT) are required on all new tankers of 20 000 dwt and above (in the parent convention SBTs were only required on new tankers of 70 000 dwt and above). The Protocol also requires that SBTs be protectively located - that is, they must be positioned in such a way that they will help protect the cargo tanks in the event of a collision or grounding.

Another important innovation concerned crude oil washing (COW), which had recently been developed by the oil industry and offered major benefits. Under COW, tanks are washed not with water but with crude oil - the cargo itself. COW is accepted as an alternative to SBTs on existing tankers and is an additional requirement on new tankers.

For existing crude oil tankers a third alternative was permissible for a period of two to four years after entry into force of MARPOL 73/78. This is called dedicated clean ballast tanks (CBT) and is a system whereby certain tanks are dedicated solely to the carriage of ballast water. This is cheaper than a full SBT system since it utilises existing pumping and piping, but when the period of grace has expired other systems must be used.

Drainage and discharge arrangements were also altered in the Protocol, regulations for improved stripping systems were introduced.

Some oil tankers operate solely in specific trades between ports which are provided with adequate reception facilities. Some others do not use water as ballast. The TSPP Conference recognised that such ships should not be subject to all MARPOL requirements and they are consequently exempted from the SBT, COW and CBT requirements.

It is generally recognised that the effectiveness of international conventions depends upon the degree to which they are obeyed and this in turn depends largely upon the extent to which they are enforced. The 1978 Protocol to MARPOL therefore introduced stricter regulations for the survey and certification of ships.

This procedure in effect meant that the Protocol had absorbed the parent convention. States which ratify the Protocol must also give effect to the provisions of the 1973 Convention: there is no need for a separate instrument of ratification for the latter. The 1973 MARPOL Convention and the 1978 MARPOL Protocol should therefore be read as one instrument, which is usually referred to as MARPOL 73/78.

2.7 Amendments to the MARPOL 73/78 Convention

The most important amendments to the MARPOL 73/78 Convention are listed below.

The October 1989 amendments

The October 1989 amendments make the North Sea a 'special area' under Annex V of the convention. This greatly increases the protection of the sea against the dumping of garbage from ships.

The 1990 amendments

The 1990 (Annexes I and V) amendments extend Special Area Status under Annexes I and V to the Antarctic.

The 1991 amendments

The 1991 amendments make the Wider Caribbean a Special Area under Annex V. Other amendments add a new chapter IV to Annex I requiring ships to carry an oil pollution emergency plan. For existing ships, the requirements can be deferred for two years.

The 1992 amendments

The 1992 amendments to Annex I of the convention which deals with pollution by oil brought in the 'double hull' requirements for tankers, applicable to new ships (tankers ordered after 6 July, whose keels were laid on or after 6 January 1994 or which are delivered on or after 6 July 1996) as well as existing ships built before that date, with a phase-in period. New-build tankers are covered by Regulation 13F, while regulation 13G applies to existing crude oil tankers of 20 000 dwt and product carriers of 30 000 dwt and above. Regulation 13G came into effect on 6 July 1995.

The amendments also considerably reduce the amount of oil which can be discharged into the sea from ships (for example, following the cleaning of cargo tanks or from engine room bilges). Originally oil tankers were permitted to discharge oil or oily mixtures at the rate of 60 litres per nautical mile. The amendments reduce this to 30 litres. For non-tankers of 400 grt and above the permitted oil content of the effluent which may be discharged into the sea is cut from 100 parts per million to 15 parts per million. Regulation 13G applies to existing crude oil tankers of 20 000 dwt and product carriers of 30 000 dwt and above.

Tankers that are 25 years old and which were not constructed according to the requirements of the 1978 Protocol to MARPOL 73/78 have to be fitted with double sides and double bottoms. The Protocol applies to tankers ordered after 1 June 1979, which were begun after 1 January 1980 or completed after 1 June 1982. Tankers built according to the standards of the Protocol are exempt until they reach the age of 30.

Existing tankers are to be subject to an enhanced programme of inspections during their periodical, intermediate and annual surveys. Tankers that are five years old or more must carry on board a completed file of survey reports together with a conditional evaluation report endorsed by the flag Administration.

Many of the tankers built in the 1970s are now approaching their 25th birthday - if they have not already done so. If they do not comply with Regulation 13F, their owners must decide whether to convert them to the standards set out in regulation 13F, or to scrap them. Another set of tankers built according to the standards of the 1978 protocol, will soon be approaching their 30th birthday - and the same decisions must be taken.

The 1994 amendments

The 1994 amendments affect four of the Convention's five technical annexes (I, II, III, and V) and are all designed to improve the way it is implemented. They will make it possible for ships to be inspected when in the ports of other Parties to the Convention to ensure that crews are able to carry out essential shipboard procedures relating to marine pollution prevention. These are contained in resolution A.742 (18), which was adopted by the IMO Assembly in November 1993.

The amendments are similar to those made to SOLAS in May 1994. Extending port State control to operational requirements is seen as an important way of improving the efficiency with which international safety and anti-pollution treaties are implemented.

The 1995 amendments

The 1995 amendments concern Annex V. They are designed to improve the way the Convention is implemented. Regulation 2 has been clarified and a new regulation 9 added dealing with placards, garbage management plans and garbage record keeping.

The 1997 amendments

Regulation 25A to Annex I specifies intact stability criteria for double hull tankers.

Another amendment makes the North West European waters a 'special area' under Regulation 10 of Annex I. The waters cover the North Sea and its approaches, the Irish Sea and its approaches, the Celtic Sea, the English Channel and its approaches and part of the North East Atlantic immediately to the West of Ireland.

The Protocol of 1997 (Annex VI)

The Protocol was adopted at a Conference held from 15 to 26 September 1997 and adds a new Annex VI on Regulations for the Prevention of Air Pollution from Ships to the Convention.

The rules will set limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibit deliberate emissions of ozone depleting substances.

The new Annex VI includes a global cap of 4,5 % m/m on the sulphur content of fuel oil and calls on IMO to monitor the world wide average sulphur content of fuel once the Protocol comes into force.

Annex VI contains provisions allowing for special 'SOx Emission Control Areas' to be established with more stringent control on sulphur emissions. In these areas, the sulphur content of fuel oil used on board ships must not exceed 1,5 % m/m. Alternatively, ships must fit an exhaust gas cleaning system or use any other technological method to limit SOx emissions. The Baltic Sea is designated as a SOx Emission Control area in the Protocol.

Annex VI prohibits deliberate emissions of ozone depleting substances, which include halons and chlorofluorocarbons (CFCs). New installations containing ozone depleting substances are prohibited on all ships. But new installations containing hydro-chlorofluorocarbons (HCFCs) are permitted until 1 January 2020.

The requirements of the IMO Protocol are in accordance with the Montreal Protocol of 1987, as amended in London in 1990. The Montreal Protocol is an international environmental treaty, drawn up under the auspices of the United Nations, under which nations agreed to cut CFC consumption and production in order to protect the ozone layer.

Annex VI sets limits on emissions of nitrogen oxides (NOx) from diesel engines. A mandatory NOx Technical Code, to be developed by IMO, will define how this is to be done. The Annex also prohibits the incineration on board ship of certain products, such as contaminated packaging materials and polychlorinated biphenyls (PCBs).

Latest amendments to MARPOL 73/78 adopted at the 43rd session of MEPC

At its 43rd session the Marine Environment Protection Committee (MEPC) of IMO adopted regulations making certain sized tankers carrying persistent oils (such as heavy fuel oil) as cargo subject to the same stringent requirements as crude oil tankers.

The amendments to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78) will make existing oil tankers between 20,000 and 30,000 tons dead weight carrying persistent product oil, including heavy diesel oil and fuel oil, subject to the same construction requirements as crude oil tankers. The amendments, expected to enter into force on 1 January 2001, under tacit acceptance, relate to Regulation 13G of Annex I (Regulations for the Prevention of Pollution by Oil).

Regulation 13G requires, in principle, existing tankers to comply with requirements for new tankers in Regulation 13F, including double hull requirements for new tankers or alternative arrangements, not later than 25 years after date of delivery. Currently, the regulation applies to crude oil tankers of 20 000 tons dead weight and above and product carriers of 30 000 tons dead weight and above, but does not currently apply to tankers between 20 000 and 30 000 tons dead weight which carry heavy diesel oil or fuel oil.

The aim of the amendments is to address concerns that oil pollution incidents involving persistent oils are as severe as those involving crude oil, so regulations applicable to crude oil tankers should also apply to tankers carrying persistent oils.

The Committee also adopted related amendments to the Supplement of the IOPP (International Oil Pollution Prevention) Certificate, covering in particular oil separating/filtering equipment and retention and disposal of oil residues.

2.8 Further development of the MARPOL 73/78 Convention

The revision of the MARPOL 73/78 Convention is continuously going on. At the moment there are two important issues under consideration at IMO:

- A legal instrument to regulate the use of shipboard anti-fouling systems and
- a legal instrument to regulate the transfer of harmful aquatic organisms in ballast water from one sea area to another.

Regulations for use of shipboard anti-fouling systems

The Marine Environment Protection Committee (MEPC) decided at its 43rd meeting to propose to the IMO Council in November 1999 the holding of a Conference in the 2000-2001 biennium to adopt a legal instrument to regulate the use of shipboard anti-fouling systems, in particular to phase out those containing organotins such as tributyltin (TBT).

At the last session (MEPC 42), the Committee agreed a draft Assembly resolution which includes a proposed deadline of 2008 for the complete prohibition of organotins acting as biocides in antifouling systems on ships. The draft Assembly resolution will be considered by the 21st IMO Assembly in November 1999 for adoption.

Antifouling paints are used to coat the bottoms of ships to prevent sealife such as algae and molluscs attaching themselves to the hull - thereby slowing down the ship and increasing fuel consumption. In the early days of sailing ships, lime and later arsenic was used to coat ships' hulls, until the modern chemicals industry developed effective antifouling paints using metallic compounds.

The compounds slowly 'leach' into the sea water, killing barnacles and other marine life that have attached to the ship - but studies have shown that these compounds persist in the water, killing sealife, harming the environment and possibly entering the food chain. One of the most effective antifouling paints, developed in the 1960s, contains the organotin tributyltin (TBT), which has been proven to cause deformations in oysters and sex changes in whelks.

The harmful environmental effects of organotin compounds were recognized by IMO in 1990, when the MEPC adopted a resolution which recommended that Governments adopt measures to eliminate the use of antifouling paint containing TBT on non-aluminium hulled vessels of less than 25 metres in length and eliminate the use of antifouling paints with a leaching rate of more than 4 microgrammes of TBT per day. Some countries, such as Japan, have already banned TBT in antifouling paint for most ships.

Alternatives to TBT paint include copper-based coatings and silicon-based paints, which make the surface of the ship slippery so that sealife will be easily washed off as the ship moves through water. Further development of alternative anti-fouling systems is being carried out. Underwater cleaning systems avoid the ship having to be put into dry dock for ridding the hull of sealife, while ultrasonic or electrolytic devices may also work to rid the ship of foulants.

Harmful aquatic organisms in ballast water

The proposed new regulations are intended to address the environmental damage caused by the introduction of harmful aquatic organisms in ballast water, used to stabilise vessels at sea. Globally, it is estimated that about 10 billion tonnes of ballast water is transferred each year.

The water taken on board for ballasting a vessel may contain aquatic organisms, including dormant stages of microscopic toxic aquatic organisms - such as dinoflagellates, which may cause harmful algal blooms after their release. In addition, pathogens such as the bacterium vibrio cholerae (cholera), have been transported with ballast water. As ships travel faster and faster, the survival rates of species carried in ballast tanks have increased. As a result, many introductions of non-indigenous organisms in new locations have occurred, often with disastrous consequences for the local ecosystem - which may include important fish stocks or rare species.

The Working Group reviewed a number of key issues based on the current proposed draft regulations, with progress reported in achieving consensus on the content of certain draft regulations. However, a number of important issues and aspects remain open for further consideration, including:

- the preferred approach to application - whether the globalised approach, the designation of Ballast Water Management Areas or other approaches;
- development of a range of standards, e.g., for evaluation and acceptance of new ballast water management and control options;
- development of a regionalisation concept; and
- the extent of application of the provisions to some categories of vessels, such as fishing vessels, pleasure boats, etc.

The overall outline of a draft legal instrument was prepared and some draft text developed, but the Committee agreed preparation of the instrument was not sufficiently advanced to be able to propose (to the IMO Council which meets prior to the Assembly in November) the holding of a Diplomatic Conference to adopt an instrument in the next biennium (2000 - 2001).

The issue will remain a high priority item in the work programme and the Committee agreed the Working Group on ballast water should continue its work at the next session.

Options for introducing the proposed regulations include:
- a new Annex to MARPOL 73/78; and
- a completely new Convention on ballast water management, under which the terms for entry into force would be determined by a Conference, instead of having to comply with existing terms established by MARPOL 73/78.

Current options for preventing the spread of harmful aquatic organisms in ballast water include exchanging the ballast water in deep ocean, where there is less marine life and where organisms are less likely to survive. Other options include various (filtration, thermo, chemical, radiation) treatments of the ballast water en route to kill the living organisms.

Recycling of ships

The Committee agreed to include an agenda item on ship recycling during its next session in March 2000 (MEPC 44).

The decision followed a proposal put forward by Norway to add ship scrapping to the work programme of the MEPC with the aim of developing safety and environmental measures regarding ship scrapping. Ships sold for scrapping may contain environmentally hazardous substances such as asbestos, heavy metals, hydrocarbons, ozone depleting substances and others. Concerns have been raised about the working and environmental conditions at many of the world's ship scrapping locations.

Follow-up to air pollution conference and new Annex VI

The MEPC adopted an MEPC resolution on Guidelines for Monitoring the World Wide Average Sulphur Content of Residual Fuel Oils Supplied for Use on Board Ships. The guidelines are intended to establish an agreed method to monitor the average sulphur content of residual fuel oils supplied for use on board ships. MEPC will at future sessions further discuss measures to reduce SOx emissions from ships, should the average sulphur level in fuels, calculated on the basis of these guidelines, show a sustained increase.

The Committee was asked by the 1997 conference on Air Pollution, which adopted a new Annex VI of MARPOL 73/78 on the Prevention of Air Pollution from Ships, to develop sulphur monitoring guidelines.

Annex VI, when it comes into force, will set limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibit deliberate emissions of ozone depleting substances.

Revision of MARPOL Annex IV

The Committee considered draft texts of amendments to MARPOL Annex IV, Regulations for the Prevention of Pollution by Sewage from Ships, prepared by the Correspondence Group. The Committee agreed to establish a drafting group on revision of MARPOL Annex IV at the next session in order to make further progress in preparation of the draft text of amendments.

MARPOL Annex IV has not yet entered into force and the Committee has been considering modifications to requirements of Annex IV which may facilitate wider acceptance by Member Governments and entry into force of the Annex.

3. Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1974 (Helsinki Convention)

The Helsinki Convention of 1974, issued to protect the marine environment of the Baltic Sea, was the first international agreement to cover all sources of pollution, both from land and from ships as well as airborne. To accomplish its aim, the Convention calls for action to curb various sources of pollution. One way of protecting the Baltic Sea Area is by regulating the discharge of ship-generated wastes.

3.1 Discharge regulations in the Baltic Sea Area

Discharge regulations and discharge regulations for Special Areas are given in the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) developed by the International Maritime Organization (IMO) - a special organisation of the United Nations. The Special Areas are environmentally sensitive sea areas. The sensitivity is characterised by special oceanographical and ecological conditions as well as the particular character of the traffic.

The Baltic Sea Area has been designated a Special Area under MARPOL 73/78, and therefore special discharge regulations must be applied. The special discharge regulations concern the discharge of oil, noxious liquid substances carried in bulk as well as garbage.

Generally speaking it is forbidden to discharge oil and noxious liquid substances in the Baltic Sea Area. Discharge of garbage is also forbidden, except for food wastes which can be discharged not less than 12 miles from the nearest land.

As for sewage the international rules are not yet in force. Annex IV of the Helsinki Convention provides for detailed provisions concerning discharge of sewage relating to sewage treatment plants, distance to the nearest land, the discharge rate and the speed of the ship. The Baltic Sea States may apply these provisions within their territorial seas also to ships not flying the flag of a Baltic Sea State.

Thus, in general the MARPOL discharge regulations are in force in the Baltic Sea Area. However, the Helsinki Convention includes also some more stringent regulations. Use of incinerators is prohibited on the territorial seas of the Baltic Sea States. In 1 July 2000 a new regulation will enter into force, which requires ships to dispose of all wastes, which are not allowed to be discharged into the sea in accordance with MARPOL 73/78 and the Helsinki Convention, to a port reception facility.

3.2 The Baltic Strategy

The annual number of observed illegal oil discharges originated from ships has been around 400 during this decade. To eliminate these discharges the Helsinki Commission has developed a complex of measures known as the Baltic Strategy for Port Reception Facilities for Ship-generated Wastes and Associated Issues, approved in 1995.

The Baltic Sea States shall apply the 'no-special-fee' charging system for the use of reception facilities, whereby the cost of reception, handling and disposal of ship-generated wastes, originating from the normal operation of a ship, is included in the harbour fee or otherwise charged to the ship irrespective of whether wastes are actually delivered. The system now applies to oily wastes from machinery spaces, and the inclusion of sewage and garbage is expected. All ships, with some exemptions, will be subject to a mandatory discharge of all wastes to a port reception facility before leaving a port. The new HELCOM Recommendations also cover matters related to notification by a ship of her wastes before entry to a port, guidelines concerning waste management plans for ports, and ashore handling of wastes.

3.3 Further development of HELCOM Recommendations

Transportation of oil is increasing in the Baltic Sea and new oil terminals are under construction in the Baltic Sea Area. Therefore the risk for a major oil tanker accident is increasing. A technical measure to minimise this risk would be to use only double-hull tankers for oil transportation. The Maritime Committee of the Helsinki Commission is discussing on the possibility to adopt a new HELCOM Recommendation which would enhance the use of double-hull oil tankers in the Baltic Sea Area.

4. The EU regulations

The European Union has put into force some regulations which also concern ships, like the Council regulation (EC) No 3093/94 of 15 December 1994 on substances that deplete the ozone layer and EU Directive 93/75/EEC concerning minimum requirements for vessels entering or leaving Community ports and carrying dangerous or polluting goods.

Recently the European Commission has elaborated a proposal for an EU directive on port reception facilities. This directive has the same purpose as the Baltic Strategy and contains the same elements as the corresponding HELCOM recommendations.

5. The Finnish legislation

The MARPOL 73/78 Convention and Annex IV to the Helsinki Convention have been implemented by the Act on the Prevention of Pollution from Ships, 1979, and by the Decree on the Prevention of Pollution from Ships, 1993. The restrictions on discharge from ships, referred to in the Act on the Prevention of Pollution from Ships and rules and regulations issued under it, apply to all vessels, regardless of flag, sailing in the Finnish waters.

In principle, the MARPOL discharge regulations are adopted in the national legislation. However, in some details the Finnish discharge regulations are stricter than the MARPOL regulations and the HELCOM regulations. Discharge of oily mixtures, even with oil content less than 15 ppm, is totally prohibited in the Finnish territorial waters. The use of tankers equipped with a double bottom is encouraged by the use of economic incentives.

6. Summary

The adoption of the MARPOL 73/78 Convention in the 1970's has greatly cut down harmful discharges from ships into the sea. Discharge regulations for oil, hazardous substances in bulk and in packaged form, and garbage are in force. The air pollution Annex VI was adopted in 1997 and waits for its entry into force. Regulations for use of shipboard anti-fouling systems and regulations to abate the effects of harmful aquatic organisms in ballast water are under development at IMO.

Regulations for discharge of sewage have been brought in the force by the Helsinki Convention. A great number of HELCOM Recommendations have been adopted by the Helsinki Commission in order to give further guidelines and rules which contribute to the implementation of the MARPOL regulations.

Transportation of oil is increasing in the Baltic Sea and new oil terminals are under construction in the Baltic Sea Area. Therefore the risk for a major oil tanker accident is increasing. Especially when considering the Gulf of Finland such an accident would have very serious consequences for the marine environment. Therefore all measures should be used to improve the safety of shipping in the Gulf of Finland including the use of double-hull tankers for oil transportation.

7. References

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EMISSIONS FROM MARITIME TRAFFIC

Introduction

Maritime traffic is often considered as environmentally friendly mean of transportation when the transported amounts and consumed energy is taken into account. Ship emissions may although locally have relatively significant effects on the environment near ports, in coastal areas and along busy shipping routes. Recently it has been presented results from emission inventories indicating that waterborne traffic may also play rather big role in world-wide and also in Finland when the total amount of acidifying or greenhouse gas emissions are considered. In last decades the efforts to put down the acidifying emissions in the Europe have been rather successful. In the Europe the total sulphur dioxide emissions have decreased 26 % and nitrogen oxides emissions 15 % from 1990 to 1995. At the same time there has not been almost at all degreasing in the ship emissions.

Emission inventories can be used to estimate the changes in time in emission amounts and to estimate what part of emissions is caused by different source categories in different study areas. The emission amounts alone do not indicate the environmental effects. Dispersion modelling is a useful tool to find out the environmental effects that different sources of pollutant have. For example with dispersion models it is possible to find out the levels of air pollutants concentration and deposition of acidifying compounds caused by different source categories in specified areas. It is possible also to estimate the concentrations and deposition in the future with different emission scenarios.

Emissions from ships

The amount of ship emissions in a specified study area depends on the fuel consumption corresponding to the ship traffic mileage of different kinds of ships. Sulphur dioxide emissions depend on the fuel's sulphur content. Other emissions of pollutants, for example nitrogen oxides, can be calculated from the used energy by the specific emission coefficients. The results of emission inventory depend on the accuracy of the traffic data, used emission coefficients and especially on what is the study area and activities taken into account in the inventory. Traditionally the ship emissions figures of country include only emissions from domestic traffic and do not include for example the emissions from international traffic or military traffic. The emissions of country or other study area depend also on the distance of shipping routes outside port area the emissions are taken into account. Because the above mentioned differences in emission inventories the emission figures between countries or other areas are not always comparable. This is also true for the emission figures presented in this paper.

The World

Global emission inventories of maritime traffic are usually based on the international marine-fuel usage information. The total fuel usage is divided into different engine and ship types with different emission characteristics with the help of ship and traffic statistics. The geographical distribution of emissions can be examined by global vessel traffic densities for various engine types.

World's total sulphur dioxide emissions in 1990 are estimated to be about 150 Tg/year (Tg=10^6 tons) and total nitrogen oxide emissions about 100 Tg/year (Benkovitz et al. 1997 & Benkovitz et al. 1998). The burning of fossil fuels is responsible for over 70 % of SO_2 and NO_x emissions.

According to the inventory made by Corbett & Fischbeck (1997) the total global ship emissions in 1996 were 10,12 Tg for NO_x and 8,48 Tg for SO_2 (table 1). The results include both commercial and military traffic. According to the statistics used in the inventory the total world fleet includes approximately 55 % slow speed diesel, 40 % medium-speed diesel and 5 % other engine types (see table 2).

World's ship emissions account for 14 % of total NO_x emissions from fossil fuels and about 5 % of total SO_2 emitted by all fuel combustion sources. Carbon dioxide emissions from ships are approximately 120 Tg/year which is 2 % of the 6000 Tg of carbon dioxide emitted from fossil fuels.

Table 1. World ship emissions for nitrogen oxides and sulphur dioxide in 1996 (Corbett & Fischbeck 1997)

Vessel type	**Emission (Tg/year;10^6 tons/year)**		**Contribution (%)**	
	NOx	**SO_2**	**NOx**	**SO_2**
Transport	**6,98**	**6,19**	**69**	**73**
Bulk cargo	3,34	2,97	33	35
General cargo	3,14	2,71	31	32
Passenger	0,51	0,51	5	6
Non-transport	**3,14**	**2,29**	**31**	**27**
Fishing	0,71	0,59	7	7
Service craft	1,01	0,85	10	10
Military	1,32	0,76	13	9
Other	0,10	0,08	1	1
Total	**10,12**	**8,48**	**100**	**100**

Table 2. World ship engine profile and emission factors for nitrogen oxides (Corbett & Fischbeck 1997)

Engine type	Military	Commercial	Emission factor – Nox (g/kg, fuel)
Slow-speed diesel	1 289	56 628	87
Medium-speed diesel	14 940	27 758	57
Steam and others	3 417	1 820	8,8
Total	19 646	82 206	

Europe

The estimates of European emissions of air pollutants are made with the CORINAIR (CORe INventories AIR) inventory. The emissions are estimated by each European country separately with the same CORINAIR methods and the results are reported to the European Environment Agency (EEA). With this procedure it is possible to have comparable emission figures for all European countries.

The total sulphur dioxide emissions in Europe (for 28 countries) were 28 000 ktons in 1990 and total nitrogen oxide emissions 18 000 ktons. Over 90 % of SO_2 emissions were caused by industry and energy production and over 40 % of NO_x emissions were caused by road traffic. The ship emissions contributed 1,3 % of total SO_2 emissions and 4,4 % of total NO_x emissions. These figures do not include all emissions from international shipping in the European area.

Table 3. SO_2, NO_x and CO_2 emissions from maritime activities and the total emissions in Europe (28 countries) in 1990 (CORINAIR90).

Source	Emission (ktons/year; CO_2 Mtons/year)			Contribution (%)		
	SO_2	NOx	CO_2	SO_2	NOx	CO_2
Inland waterways	12	71	5	3	9	15
Marine activities	5	21	1	2	3	3
Harbours	59	82	5	17	10	15
National sea traffic	249	468	15	71	60	44
National fishing	25	143	8	7	18	23
Total, ships	350	785	34	100	100	100
Total, all sources	27 874	17 923	4 764			
Contribution of ship emissions (%)	1,3	4,4	0,7			

The emission figures in 1990 for 15 European countries were according the IPCC (Intergovernmental Panel on Climate Change) inventory 13 260 ktons for NO_x and 3 370 Mtons for CO_2 without the international bunkers. If the internationals bunkers are included into the figures they are respectively 14 780 ktons for NO_x and 3 538 Mtons for CO_2. In the year 1996 the emission figures were 11 645 ktons for NO_x and

3 305 Mtons for CO_2 with international bunkers. Contribution of international marine bunkers is about 9 % of the total NO_x emissions and about 3 % of the total CO_2 emissions.

The region of the Gulf of Finland

Table 4. Traffic emissions in 1992 in the region of Gulf of Finland (Mäkelä & Salo 1993).

Pollutant/Region	Road traffic	Railway traffic	Air traffic	Ships	Total
Sulphur dioxide (tons/year)					
St. Petersburg	5 060	100	84	679	5 920
Leningrad Oblast	970	907	-	224	2 100
Karelia	514	941	0,5	92	1 550
Estonia	1 640	151	33	755	2 580
Latvia	2 380	321	25	908	3 630
Lithuania	3 340	594	15	311	4 260
Total	**13 904**	**3 014**	**157**	**2 969**	**20 040**
Nitrogen oxides (tons/year)					
St. Petersburg	25 400	1 310	640	1 010	28 400
Leningrad Oblast	7 920	11 800	-	3 930	23 700
Karelia	3 940	12 200	5	634	16 800
Estonia	14 590	1 960	206	1 150	17 800
Latvia	20 600	4 170	152	975	25 900
Lithuania	30 200	7 720	90	900	38 900
Total	**102 650**	**39 160**	**1 093**	**8 599**	**151 500**
Carbon dioxide (ktons/year)					
St. Petersburg	2 980	82	671	105	3 840
Leningrad Oblast	634	735	-	217	1 590
Karelia	309	762	4	34	1 110
Estonia	1 180	122	183	117	1 600
Latvia	1 600	260	197	121	2 180
Lithuania	2 360	481	121	70	3 030
Total	**9 063**	**2 442**	**1 176**	**664**	**13 350**

Mäkelä & Salo (1993) have estimated the traffic emissions in the region of Gulf of Finland. The inventory included emissions from road traffic, railway traffic, air traffic and waterborne traffic. The inventory area covered St Petersburg, Karelia, Leningrad Oblast, Estonia, Latvia and Lithuania. The total traffic emissions in the study area in 1992 were estimated to be 20 ktons for SO_2 and 151 ktons for NO_x. Contribution of road traffic was almost 70 % for both pollutants. The contribution of ship emissions were 15 % for SO_2 and 6 % for NO_x (see table 4 above). Emission figures do not include all of the international ship emissions in the Gulf of Finland.

Finland

The total sulphur dioxide emissions in Finland in 1996 were slightly above 100 ktons and nitrogen oxide emissions almost 270 ktons. Over 70 % of SO_2 emissions were contributed by energy production. On the other hand the contribution of traffic from NO_x emissions was over 60 % and the contribution of road traffic was almost 50 %. Sulphur dioxide emissions of Finland have decreased from 600 ktons in 1980 to 100 ktons in 1996. On the other hand at the same time there has been almost no change in the nitrogen oxides emissions.

Traffic emissions in Finland are nowadays calculated annually with the emission calculation system LIPASTO which has been developed in VTT (Technical Research Centre of Finland) Communities and Infrastructure. LIPASTO has also subsystem MEERI (Mäkelä et al. 1998) concerning ship emissions. MEERI calculation system includes both sea and inland water traffic, leisure boating and fishing and icebreaker traffic. Boats and vessels of the Finnish army are not included. Also the international traffic inside economic boundary of Finland is included in the calculation.

The SO_2, NO_x and CO_2 emissions calculated with MEERI is presented in table 5 for the year 1998. The ship emissions in 1998 were over 18 000 tons for SO_2 and over 65 000 tons for NO_x. Major part of the emissions were caused by the emissions originated in the shipping routes.

Traffic SO_2, NO_x and CO_2 emissions in Finland in 1998 according to IPCC source categories are presented in the table 6 together with the estimated total emissions in Finland. The calculated emissions of international shipping contributes 92 % of the total ship SO_2 emissions, 86 % of the total ship NO_x emissions and 83 % of total ship CO_2 emissions. If only domestic traffic emissions are considered the contribution of ship SO_2 emissions is about 2 % of the country total and the contribution for NO_x is correspondingly 3 % and for CO_2 only 1 %. If also the emissions from international shipping are included in the emission figures is the contribution of ship emissions for SO_2 16 %, for NO_x 21 % and for CO_2 5 % from country total (see table 6).

Table 5. Ship SO_2, NO_x and CO_2 emissions in 1998 in Finland. Figures include also the emissions from international shipping inside economic boundary of Finland (Mäkelä 1999).

Source	Emission (tons/year; CO_2 ktons/year)			Contribution (%)		
	SO_2	NOx	CO_2	SO_2	NOx	CO_2
Ports	2 158	6 393	283	12	10	10
Shipping routes	15 654	53 135	2 110	86	81	76
Leisure boats	69	1 250	173	<1	2	6
Fishing and other work vessels	105	3 003	139	1	5	5
Icebreakers	214	1 612	55	1	2	2
Total	**18 200**	**65 393**	**2 760**	**100**	**100**	**100**

Table 6. SO_2, NO_x and CO_2 emissions in Finland in 1998 according to IPCC source categories (Mäkelä 1999).

Source	Emission (tons/year; CO_2 ktons/year)		
	SO_2	NOx	CO_2
Domestic traffic emissions			
Road traffic	286	117 945	10 953
Railway traffic	88	3 777	178
Waterborne traffic	1 450	7 869	435
Air traffic	96	1278	391
Domestic traffic total	**1 920**	**130 869**	**11 957**
Other traffic emissions			
Electric locomotives	172	193	103
International waterborne	16 717	56 540	2 278
Fishing boats	34	984	45
International air traffic	167	1 942	668
Other traffic total	**17 090**	**59 659**	**3 094**
Traffic total	**19 010**	**190 528**	**15 051**
Other sources (prediction)	94 000	128 000	45 000
Finland total, IPCC	**95 920**	**258 869**	**56 957**
Finland total , including other traffic emissions	**113 010**	**318 528**	**60 051**
Contribution of domestic ship emissions (%), IPPC	2	3	1
Contribution of total ship emissions (%)	16	21	5

Dispersion model for maritime emissions

Dispersion model

The areal concentrations and depositions of atmospheric pollutants can be analysed with the atmospheric dispersion models. The dispersion model is a mathematical solution for the processes of air physics and chemistry used to describe the dispersion of pollutants in the atmosphere. For example turbulent diffusion, chemical transformation, deposition processes and meteorology are taken into account in the models.

With the dispersion models it is possible to find out the areal concentrations and deposition in specified study area. It is possible also to calculate separately the contribution of different source categories or individual sources on total concentration or deposition. Dispersion model is also a useful tool to find out the future concentrations or depositions in different emission scenarios or to compare for example the environmental effects of different emission reduction strategies. For example with the air quality measurements this kind of information is impossible to find out.

The overall structure of the Urban Dispersion Modelling System (UDM-FMI) developed and used in local scale in the Finnish Meteorological Institute (FMI) is presented in figure 1. The dispersion module of the system utilises input emission data, pre-processed meteorological data and geographical data. The model computes hourly time series of the concentrations of pollutants. From the modelled time series the system computes statistical parameters, which can be compared to air quality guidelines or limit values. The results can be presented as maps which present the spatial distributions of concentrations or depositions. The model takes into account all source categories (point, areal, volume and line). It includes a treatment of chemical transformation (for NO_2) and deposition (dry and wet deposition for SO_2 and dry deposition for NO_2), plume rise, downwash phenomena and the dispersion of inert particles. The model also allows for the influence of a finite mixing height.

The UDM-FMI system has been tested and validated against national urban air quality measurements. According to these comparisons, the model predicts fairly well the statistical parameters. In figures 2 and 3 is presented the comparison of predicted and measured NO_2 concentrations. The agreement of the measured and predicted concentrations was good at all the measurement stations considered.

Dispersion model for ship emissions

Also the methods for evaluating the dispersion of maritime emissions have been developed in the FMI. The ship emissions at the port is described in the model as point sources and the emissions at the shipping routes as line sources. By using line sources it is possible to have better areal resolution in the model with less computer power. The emission figures and the several technical parameters are needed as an input data for the model. Also the shipping and traffic statistics in monthly, daily and hourly bases are needed to evaluate the emissions fluctuation in time. The dispersion calculations for maritime emissions have been carried out for example for ports of

Turku, Naantali and Helsinki (Pietarila et al. 1997, Pesonen et al. 1996, Pietarila & Rasila 1997).

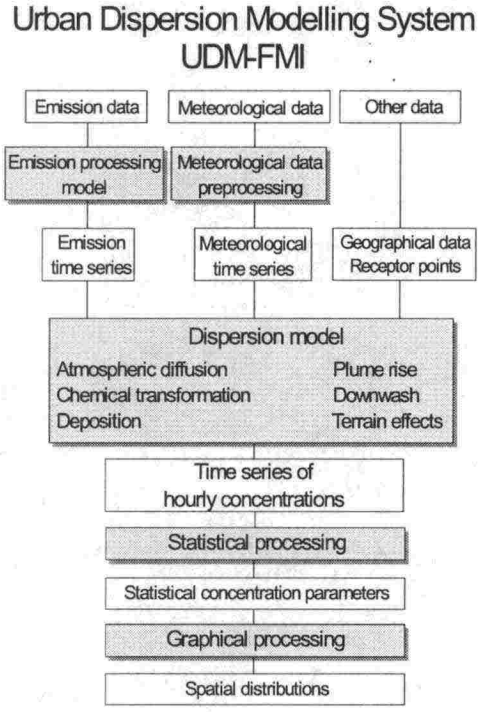


Figure 1. The overall structure of the Urban Dispersion Modelling System (Karppinen et al. 1998).

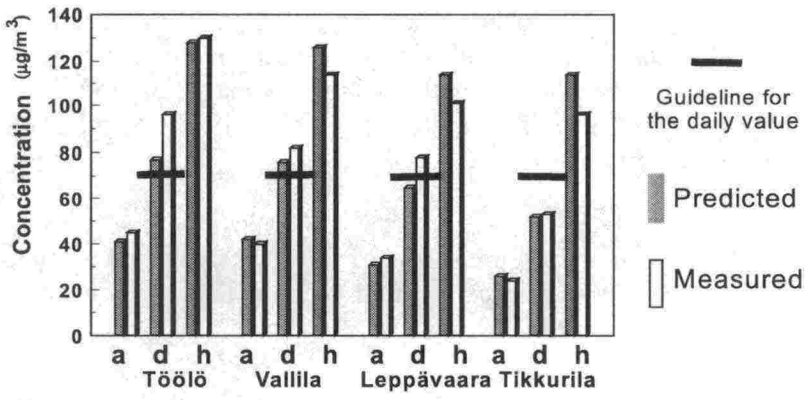


Figure 2. Comparison of the measured and predicted NO_2 concentrations in the Helsinki Metropolitan area: a=annual mean, d=daily mean, h=hourly mean (Karppinen et al. 1997).

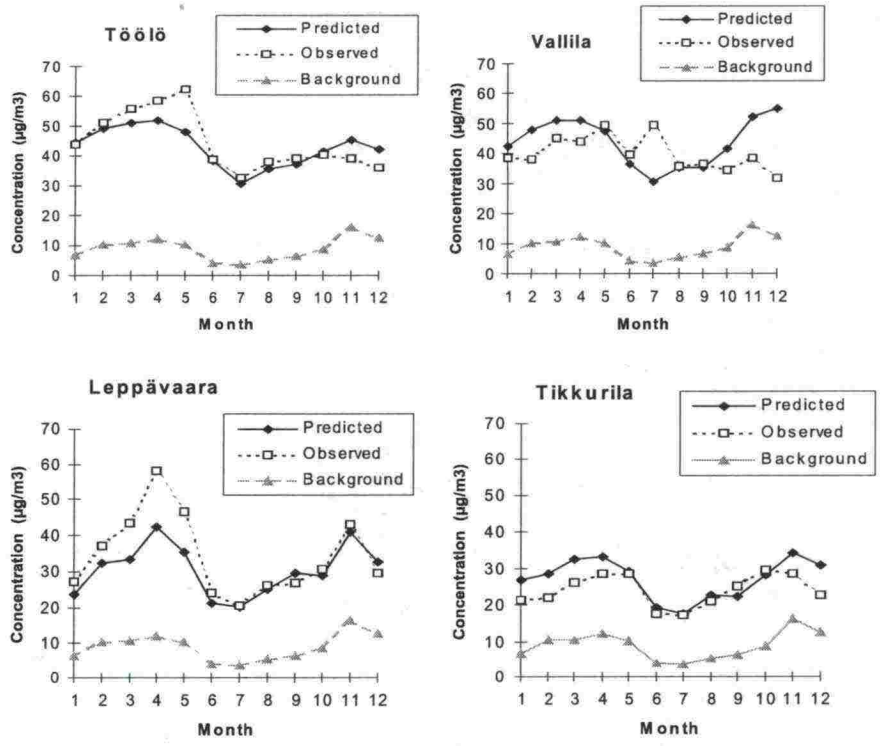


Figure 3. Comparison of the measured and predicted NO_2 concentrations in the Helsinki Metropolitan area (Karppinen et al. 1997).

Dispersion of nitrogen oxide emissions in Helsinki Metropolitan area

FMI has applied dispersion models to evaluate the dispersion of nitrogen oxides in the Helsinki Metropolitan area (Helsinki, Espoo, Vantaa and Kauniainen). All major emission categories was included in the model: energy production, industry, road traffic, air traffic, maritime traffic and separate heating. Areal NO_2 and NO_x concentrations and nitrogen deposition was computed for the year 1993 as a total and separately for each source category.

Estimated total NO_x emissions in 1993 were 27 910 tons for the study area. Energy production contributed 48 % and mobile sources 43 % of total emissions. The NO_x emissions from maritime traffic was 1 223 tons which account for 4,4 % of total emissions (figure 4).

Maritime emissions from four ports locating in the study area were taking into account: the west harbour, the south harbour and the harbours of Sörnäinen and Laajasalo. Ship emissions were taking into account in ports and in routes. Port emissions include all emission caused by ships in port area (both when moving or during lay days at the dock). Also the emissions from other port activities were taken into account in calculations, namely trains, working machines and heavy traffic.

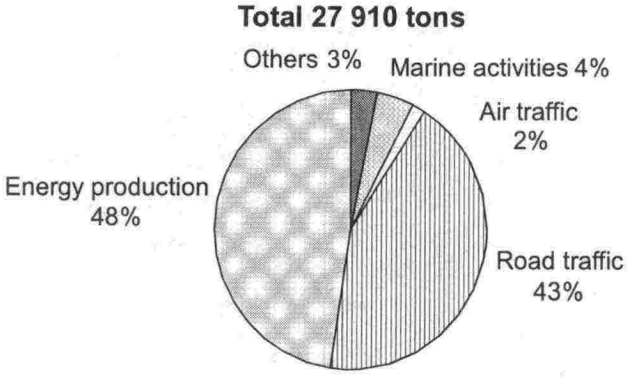


Figure 4. Nitrogen oxide emissions in the Helsinki Metropolitan area in 1993.

The total NO_x ship emissions were in 1993 1127 tons. About 77 % of that was originated in ports. Other port activities contributed 96 tons of NO_x emissions which is 8 % of the total emissions caused by port of Helsinki (table 7).

Table 7. Nitrogen oxide emission of the port of Helsinki in 1993.

	NO_x emissions (tons/year)			
	Ships		**Machinery, trains**	
Harbour	**Port**	**Routes**	**and trucks**	**Total**
The South harbour	583	187	-	770
Sörnäinen	148	24	50	222
The West harbour	122	46	46	214
Laajasalo oil terminal	15	2	-	17
Total	**868**	**259**	**96**	**1 223**

As results from dispersion calculations maps of spatial distribution of annual, daily and hourly mean NO_2 and NO_x concentrations were presented for contribution of different source categories and as a total. As an example of these results the annual mean NO_2 concentration caused by maritime emissions is presented in figure 6 and the total concentration distribution in figure 7. Also the deposition of nitrogen was modelled. The maximum statistical NO_2 concentrations in study area for each source category is presented in table 8.

NO_2 and NO_x concentrations and N deposition in the Helsinki Metropolitan area is mainly caused by road traffic emissions. Contribution of ship emissions is relatively small. The emissions from ships may have noticeably effects on nitrogen oxide pollution levels in rather small areas near the harbours and along the ship routes.

Table 8. The maximum annual, daily and hourly NO_2 concentration contributed by different emission source categories in the Helsinki Metropolitan area in 1993 (Pesonen et al. 1996)

NO_2 concentration ($\mu g/m^3$)	Energy-production	Road traffic	Air traffic	Marine Activities	Guide-line
Annual mean	1	68	15	14	
Highest daily mean	11	131	55	41	
Second highest daily mean*	8	123	44	36	70
Highest hourly mean	57	372	301	115	
99 percentile hourly mean*	18	206	145	70	150

*) concentrations comparable with the Finnish air quality guidelines

Table 9. The maximum annual nitrogen deposition contributed by different emission source categories in the Helsinki Metropolitan area in 1993 (Pesonen et al. 1996)

Source category	N deposition ($mg/m^2/year$)
Energy production	4
Road traffic	504
Air traffic	111
Marine activities	11
Total, local sources	511

Dispersion of sulphur dioxide and nitrogen oxide emissions in Turku region

In the dispersion study made in Turku region (Pietarila et al. 1997) was the emission inventory for SO_2 and NO_x carried out covering the emission sources of energy production, industry, road traffic, railway traffic, ship traffic and separate heating. The study area covered the cities of Turku, Naantali, Raisio and Kaarina. Dispersion calculations for these emission sources were carried out for the total contribution of all sources and separately for each source category to find out the importance of each category. The spatial distributions of SO_2, NO_2 and NO_x concentrations and sulphur and nitrogen deposition were prepared as maps.

The total SO_2 emissions in the study area was 7 420 tons and the total NO_x emissions 9150 tons in 1994. Energy production contributes over 90 % of total SO_2 emissions and over 50 % of the total NO_x emissions in the Turku region. The emissions from marine activities contributed 2 % of the total SO_2 emissions and 7 % of the total NO_x emissions (figure 5).

The emissions of the marine activities from the ports of Turku and Naantali were considered in the emission inventory and dispersion calculations. The results from emission inventories made for marine activities are presented in table 10. Emissions from working machines were taking into account only from the port of Turku. The total emissions from marine activities in Turku region in 1994 were 156 tons for SO2, 623 tons for NOx, and 53700 tons for CO2.

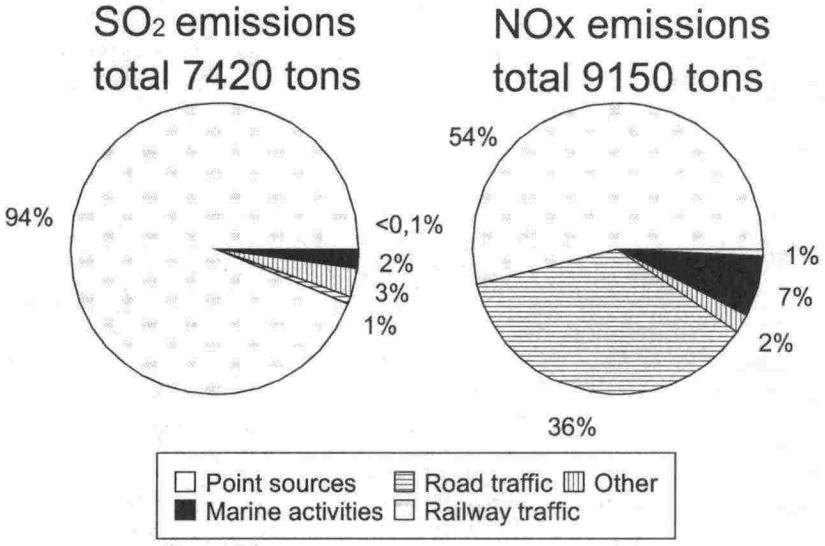


Figure 5. SO_2 and NO_x emissions in the Turku region in 1994.

Table 10. SO_2 and NO_x emissions from marine activities of ports of Turku and Naantali in 1994.

	Emissions (tons/year)	
	SO_2	NO_x
Port of Turku		
Port	39	152
Manoeuvres	10	40
Routes	57	222
Machinery	0,6	19
Total	**107**	**433**
Port of Naantali		
Port	31	120
Manoeuvres	2	7
Routes	16	63
Total	**49**	**190**
Total	**156**	**623**

The dispersion of SO_2 and NOx emission were modelled so that the contribution of different source categories could be evaluated. The maximum statistical SO_2 and NO_2 concentrations and nitrogen and sulphur deposition in study area for each source category is presented in tables 11 - 13.

Table 11. The maximum annual, daily and hourly SO_2 concentration contributed by different emission source categories in the Turku region in 1994 (Pietarila et al. 1997)

SO_2 concentration ($\mu g/m^3$)	Point Sources	Separate heating	Road traffic	Rail traffic	Marine activities	Guide-line
Annual mean	4	0,1	3	1	2	
Highest daily mean	130	9	10	4	13	
Second highest daily mean*	86	5	8	3	8	80
Highest hourly mean	400	147	38	29	125	
99 percentile hourly mean*	252	34	18	12	45	250

*) concentrations comparable with the Finnish air quality guidelines

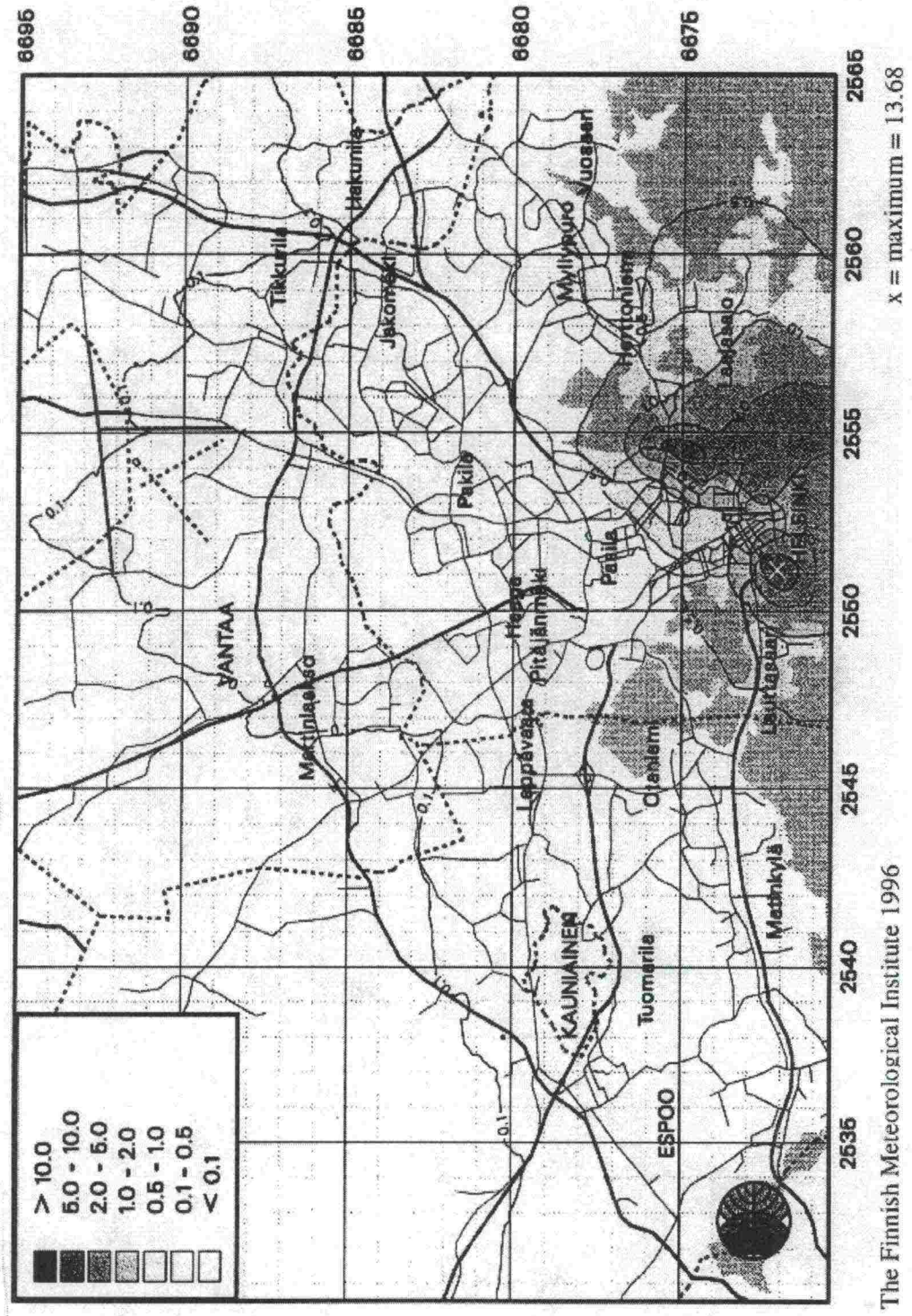
Table 12. The maximum annual, daily and hourly NO_2 concentration contributed by different emission source categories in Turku region in 1994
(Pietarila et al. 1997).

NO_2 concentration ($\mu g/m^3$)	Point Sources	Separate heating	Road traffic	Rail traffic	Marine activities	Guide-line
Annual mean	0,4	0,1	48	9	6	
Highest daily mean	6	2	102	26	35	
Second highest daily mean*	5	1	88	23	26	70
Highest hourly mean	54	34	287	74	170	
99 percentile hourly mean*	14	7	189	60	86	150

*) concentrations comparable with the Finnish air quality guidelines.

Table 13. The maximum annual sulphur and nitrogen deposition contributed by different emission source categories in the Turku region in 1994 (Pietarila et al. 1997).

Emission source	Deposition (mg/m^2/year)	
	Sulphur	Nitrogen
Point sources	265	< 1
Household heating	11	< 1
Road traffic	166	318
Rail traffic	63	17
Marine activities	106	33
Total, local sources	361	328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6685
6680
6675
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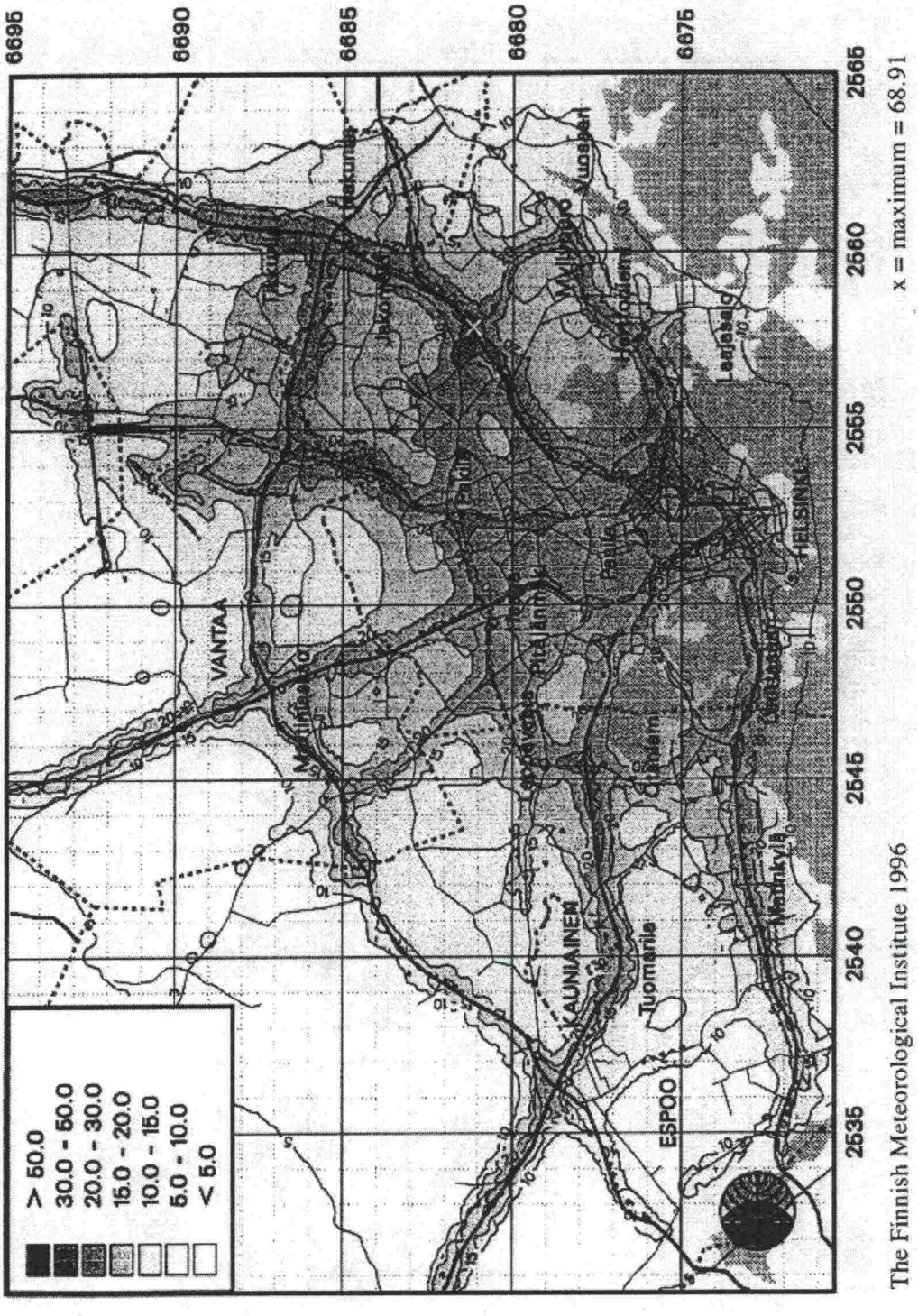
2565
> 10.0
5.0 - 10.0
2.0 - 5.0
1.0 - 2.0
0.5 - 1.0
0.1 - 0.5
< 0.1
VANTAA
Tikkurila
Hakunila
Jakomäki
Myllypuro
Vuosaari
Pakila
Herttoniemi
Laajasalo
Malminkartano
Lappavaara
Pitäjänmäki
Pasila
Oulunkylä
Laurinlahti
KAUNIAINEN
Tuomarila
ESPOO
Matinkylä
HELSINKI
0.1
0.5
1.0
1.5
The Finnish Meteorological Institute 1996
x = maximum = 13.68

Figure 6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VANTAA
KAUNIAINEN
ESPOO
HELSINKI
Tuomarila
Jokiniemi
Pasila
Laajasalo
Malmkylä
x = maximum = 68.91
The Finnish Meteorological Institute 1996

Figure 7.

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ECOLOGICAL EDUCATION FOR PORT SPECIALISTS

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At the beginning of my lecture, I would like to give some examples of ecological problems in Russia. The environmental condition in the Russian Federation is still extremely inclement, and in some regions the ecological situation has become critical and extreme measures are required.

This is especially true in the industrial centres of the European side of Russia as well as in Ural, Siberia and the Far East, where high contamination rates are found in atmospheric air and water. These rates often exceed the highest permissible concentrations (by 5 - 10 times). By reducing the industrial production output more than 50 %, emissions from permanent sources were reduced totally by 30 %, while discharges of contaminated waters by 10 - 15 %. In large towns, where more than a half of hazardous emissions originates from traffic (in Moscow 80 %, St. Petersburg 70 %) the emission of hazardous substances, for example, into atmospheric air has increased by 30 - 50 %.

The unfavourable environmental condition affects more and more the health of the population. An increase of diseases, caused by the influence of unfavourable factors is observed, e.g. allergic, respiratory organ and congenital diseases of children. Especially this concerns the Gulf of Finland, because even 70 % of its contaminations are originating from the Neva river and St. Petersburg.

All this has resulted in a severe decrease of the average life time among the population in Russia (for example, 57 years for men). The mortality rate of the population able to work has increased radically. The average natural decrease of population in Russia since 1993 is about 800 000 per year. In 77 of 89 subjects in the Russian Federation, a decrease of population (incl. St. Petersburg) is observed, while this amount is increasing only in 22 subjects.

On a national basis, the ecological problems of Russia influence on a number of some other vital problems.

Ecological problems are solved within the framework of the following four global matters:
- legislation;
- education;
- management;
- research.

One of the most important tools to regulate the environmental problems is the ecological legislation which specifies the limits of the participation of a state and community in the management of environmental protection.

In the Russian Federation, the rights of the citizens to a favourable environment and sufficient information of the condition of the environment are ensured in Article 42 of the Constitution.

The establishment of ecological legislation lies at the actual development stage of the Russian community. The State Duma of the Russian Federation has accepted hundreds of ecological laws at legislative meetings. The basic laws shall include the following: 'About environmental protection', 'About the ecological expertise', 'About the radiation safety of population', 'About the protection of atmospheric air' etc. Many laws are now under consideration. With special pride I can mention the law proposal 'About the noise control of population in the Russian Federation', drafted under my leadership and presented for the State Duma.

I would like to pay a special attention to the questions of ecological education and education. By evaluating the education on the whole in this field in Russia, I would like to bring out the progress occurred here. Only 10 - 12 years ago, themes like ecology and safety of vital functions were unknown matters for a wide number of people, except of specialists. Now courses in ecology are held in schools, institutions and universities. Specialists in ecology with the most diverse profile are graduated: managers, engineers, economists, etc. I would say that we observe here even an extreme enthusiasm with this problem. Perhaps, there is no university left in the country which would not prepare ecologists of any profile. Almost in all universities there are open faculties of ecology.

The 'Ecology and vital functions' faculty was established at the Baltic State Technical University 'VOENMEH' 15 years ago. Over 30 persons are working at the faculty, doctors, aspirants and masters. In the faculty there are 4 doctors of science, 12 candidates of science and 3 doctors honoris causa of the Baltic State Technical University. The faculty publishes periodicals, organizes every-year all-Russia conferences and seminars of ecology, international congresses, carries out researching in the area of anthropogenic physical fields. As regards the scientific potential, I assume that the faculty is nowadays one of the major scientific centres in the field of ecology in Russia. We also maintain serious scientific contacts with specialists and scientists in more than 50 countries (including Finland, Denmark, and the Baltic countries).

We also take part in the education of specialists, i.e. ecologists of sea ports. In Russia there is an education system for sea port ecologists. For this purpose, two seminars will be held, one in Moscow in March and another in St. Peterburg in September. This is already our fifth seminar concerning the ecology of sea ports, and this seminar is based, to some extent, on our proposal, expressed over one year ago in order to organize such an occasion at an international level.

In the seminars in St. Petersburg legal matters concerning ecology of sea ports, reception and disposal of waste, costs for contamination in sea ports, operations with dangerous and bulk cargoes, control of harmful substances in ports and many others were discussed. This annual seminar took place in 1996 - 1998 in St. Petersburg, Poland, Finland and this time the members are again attending here in Finland our international seminar.

Among important occasions in the ecological education and information I would also like to mention the annual all-Russia conferences, which are organized by the Federation Council and implemented by the 'Ecology' faculty at the Baltic State Technical University together with Lenkompridora and other organizations. This year we received to the conference 1 150 lectures from 50 towns of Russia and from more than 10 countries. This conference gives a survey of solutions to the basic ecological problems in the Russian ecology: in the field of environmental protection, safety of vital functions, new ecologically clean technologies, systems for ensuring the ecological safety and monitoring of environment. Over 400 specialists participated in the conference and an exhibition was organized.

As a conclusion I would like to thank, on behalf of the Russian participants, those who have organized this remarkable scientific event.

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ESTONIAN OIL SPILL COMBATING PREPAREDNESS

1. Responsible authorities

1.1 Responsible governmental authority

The Estonian Sea Inspectorate (ESI) under the Ministry of Environment is designated as the responsible governmental authority for dealing with accidental and/or operational oil pollution of the Estonian response zone (i.e. Estonian sea area plus Lake Peipsi, Lake Lämmi and Lake Pihkva). This means that the Estonian Sea Inspectorate is the overall responsible govermental authority for combating of oil pollution at sea.

Estonian Sea Inspectorate on behalf of the Ministry of Environment imposes similar responsibilities on port and harbour facilities and other terminals facing the open sea. These responsibilities imply the elaboration of local contingency plans which shall be approved by ESI behalf of the Ministry of Environment (Port Act of 31 October 1997 refers).

1.2 Responsibility of local authorities

The local governments under the Ministry of Internal Affairs are responsible for oil pollution cleaning activities in their respective costal areas. This responsibility is executed by the local rescue boards in co-operation with Estonian national rescue service co-ordinated and controlled by the Rescue Board in Tallinn.

Local government institutions are entitled to – if the local rescue forces and resources at their disposal are inadequate – request and receive the maximum amount of aid possible in emergency situations from the Rescue Board for the execution of preventive measures and for the elimination of damage resulting from emergency situations.

1.3 Responsibility of ports and oil handling facilities

The Ministry of Transport is responsible for the supervision of all Esstonian ports and oil handling facilities.

The port authorities and oil handling facilities are responsible for oil spill response and combating operations within their own areas. In cases where the spills exceed the capasity of the contingency organisation in the port or the oil handling facility, external assistance shall be requested. The amount of spilled oil to be handled by the ports/oil handling facilities own organisation is determined by the Estonian Sea Inspectorate for each specific location.

All spills, even though they can taken care of by the port authorities /oil handling facility alone, shall be reported to the ESI. Requests for external assistance shall also made to ESI through MRCC Tallinn.

2. Planning assumption

We have used a series of planning assumpsions based on valid HELCOM Recommendations and associated relevant guidelines to set up a 2 500 tons theoretical spill response capacity:

Unsheltered waters	40 %	1000 tons
Sheltered waters	20 %	500 tons
Shoreline treatment operations	40 %	1000 tons

Distribution of oil combating equipment and strike teams:

Area	Unsheltered waters	Sheltered waters	Shoreline environment	Stike teams
Tallinn	100 %		45 %	3
Haapsalu		30 %	15 %	1
Roomassaare		30 %	15 %	1
Pärnu		30 %	15 %	1
Peipsi (equipment depont only at the estuary of Emajõgi)		10 %	10 %	
Total	100 %	100 %	100 %	6

Boom length	2600 m	1400 m	800 m
Skimmer capacity	40 %	20 %	40 %
Storage capacity	20 %	40 %	40 %

For the specific conditions of Estonia, we have defined the waters between islands Saaremaa and Hiiumaa and the mainland of Estonia as well as the Estonian part of Gulf of Riga as sheltered waters, the waters west of islands Saaremaa and Hiiumaa and the Gulf of Finland we defined as unsheltered waters. We address three types of water environments as areas of operation namely the unsheltered waters, the sheltered waters and the shoreline environment.

3. Estonian Sea Inspectorate oli combating equipment

Booms

• Oilbooms EXPANDI 3000	1 500 m
• Oilbooms TATE 1000	1 400 m
• Oilboom LAMOR 1200 (2 pcs with reels)	300 m
• Oilboom type 500 (2 pcs with reels)	300 m
• Oilboom type 750 (1 pcs with reel)	200 m
• Oilboom LAMOR 1500 (with reels)	1 100 m

Skimmers

• DESMI 310 (with transfer pump and floating skimmer)	1 pcs
• FOILEX TDS 200 (with transfer pump and floating skimmer)	1 pcs
• LAMOR miniskimmer with rock cleaner	2 pcs

Power pack and pumps

• Multipurpose power pack 145 kW	1 pcs
• Multipurpose power pack 11,5 kW	1 pcs
• Hydraulic power pack Sperry-Vickers	2 pcs
• Electro-hydraulic power pack Ex-proof	1 pcs
• Hydraulic power pack LPP 0,5	1 pcs
• Hydraulic power pack LPP 1	1 pcs
• Hydraulic power pack LPP 3	1 pcs
• MAPFLEX MSP 150 transfer pump	1 pcs
• Oil transfer pump Lamor OPC4 MSP-100	2 pcs
• Vacuum pump 20 m3/h	2 pcs

Other equipment

• Lamor offshore oil skimming sweep system, spreader boom 10 m	1 set
• Lamor oil skimming sweep system, speader boom 4 m	1 set
• Oil bagging system (for different type of vessels)	2 pcs
• Oil bag storage racks (can be used on deck or cargo room)	40 pcs
• Oil bags RYT-500 (disposable)	300 pcs
• High pressure clean	2 pcs
• Oil storage tanks, 5 m^3 each (installed on TRIIN)	5 pcs
• Additional oil transfer hoses 2"; 4"; 6"	-
• Hydraulic generator lighting system	1 pcs

- Special lorry SISU (SK-210) with hydraulic crane 1 pcs
- Mobil storage service container 1 pcs
- Radio communication system Motorola GP hand phones 6 pcs
- Motorola radiostation 1 pcs

Oil recovery vessels with sweep system
- REET - spreader boom 4 m
- TRIIN - spreader boom 4 m
- VARES - spreader boom 2 m

4. Education, training and exercises

The oil combating team of the Estonian Sea Inspectorate and some specialists from Rescue Board, Border Guard and Tallinn Port passed the IMO oil spill model courses:

IMO oil spill model training course – level 1 for first responders, August 4- 8, 1997:

- Sea Inspectorate 14 pers.
- Tallinn Port 2 pers.
- Rescue Board 2 pers.
- Border Guard 2 pers.

TOTAL 20 pers.

IMO oil spill model training course – level 2 for supervisors and on-scene commanders:

- Sea Inspectorate 9 pers.
- Tallinn Port 2 pers.
- Rescue Board 1 pers.
- Border Guard 1 pers

TOTAL 13 pers.

IMO oil spill model training course – level 3 for administrators and Senior Managers:

- Sea Inspectorate 1 pers.
- Ministry of Enviroment 1 pers.
- Border Guard 1 pers.

TOTAL 3 pers.

Estonian Sea Inspectorate oil combating team and vessels have participated in last 3 years:

<u>International exercises</u>

1997 – BALEX DELTA 97 Tallinn – as organisators
1998 – BALEX DELTA 98 Gdynia – as observers
1999 – BALEX DELTA 99 Klaipeda – as observers

1998 – joint Russia-Finland-Estonia DELTA exercise as praticipantes
1999 – joint Finland-Russia-Estonia DELTA exercise as participantes

1997– CEPCO control operation in Finland as participantes
1998 – CEPCO control operation in Sweden as participantes
1999 – CEPCO control operation in Estonia as organisators

Local exercises

A different kinds of local exercises executed in Estonian waters.

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Group Manager
Environmental Emergency Response
Finnish Environment Institute

OIL SPILL PREPAREDNESS IN THE GULF OF FINLAND

1. Abstract

Within the framework of the Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1974 and 1992 (Helsinki Convention) the Contracting Parties, the nine Baltic Sea States have agreed on a common policy for response to pollution incidents threatening the marine environment. It concerns among other things criteria for national capabilities to combat spillage of oil and other harmful substances, minimization of the use of dispersants in operations and criteria for aerial surveillance. Finland fulfils mostly these requirements for national oil combatting capabilities.

There are for instance in Finland eleven Government owned ship-size vessels with an oil recovery system fitted permanently inside vessel. Municipalities have about 70 oil combatting boats of a length of 10 - 15 metres and a couple of hundreds smaller boats, whose readiness fulfils two hours demand on all coastal waters on ice free conditions. From those municipal boats12 boats have among other things oil recovery system fitted permanently inside vessel. The governmental ship-size vessels are situated along the coast so that theoretically most of the places can be reached by one of them within six hours from start from their home port. There is however some areas outside such an radius and one of the most important shortcomings is the lack of one vessel in the eastern part of the Gulf of Finland

There in the Gulf of Finland also the bilateral agreements between Finland and Russia and between Finland and Estonia on the co-operation in combatting against pollution incidents at sea are important for an efficient joint response. Because oil transport in the Gulf of Finland has almost doubled recent years and may still increase when new port projects will be accomplished, a great interest shall be paid, that capabilities to combat spillage of oil and other harmful substances will increase accordingly. Also new precautionary measures against accidents like requirements of double hull and escort towing in fairways for tankers and VTS and AIS systems for vessel traffic guidance should be fostered in Gulf of Finland.

2. General remarks

2.1 International co-operation and national organization in Finland

The environmental emergency response at sea in Finland is based on relevant Finnish laws and regulations, mainly the Act on the Prevention of Pollution from Ships (March 16, 1979) and the Decree on Oil-Combatting (June 28, 1993). These regulations and besides also the Act on Combatting Oil Pollution on Land (December 12, 1974) specifies among other things in a comprehensive way the responsible authorities, their obligations and the deviation of their task when combatting against oil pollution at sea and on land. The legislation does not yet cover other harmful substances than oil as well. However the governmental authorities, which are responsible for oil combatting at sea, take care of Finland's international obligations for other kind of pollution incidents at sea, too.

Finland is a signatory to five major international conventions relating to marine pollution:

- The Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention)
- The agreement on mutual assistance between Finland, Norway, Denmark, Sweden and Iceland (Copenhagen). Under the terms of this convention, the Nordic countries will take joint action in the event of accidental spill in the marine environment.
- The Finnish-Soviet co-operation agreement for the recovery of oil and other hazardous chemicals in accidents affecting the Baltic Sea area. Finland and Russia have agreed bilaterally to honour this agreement in practice for the present.
- The Finnish-Estonian agreement on the co-operation in combatting against pollution incidents at sea.
- The 1990 International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) While this agreement outlines the same basic duties and responsibilities as the multilateral agreements listed above, its scope is global.

Bilateral agreements are consistent with and complementary to the Helsinki Convention. They are forums to handle matters of regional importance in combatting maritime pollution incidents.

The Finnish Ministry of the Environment (ME) has the supreme responsibility for the management and supervision of the oil pollution response. The Finnish Environment Institute (FEI), operating under the Ministry, is the competent government oil pollution combatting authority. It is in charge of measures against pollution incidents at open waters and whenever severity of an incident so necessitates. The Institute is also the nationally appointed competent authority, that is empowered to request and give international assistance in combatting marine pollution caused by oil or other harmful substances. Other authorities are obliged to assist oil combatting within their abilities. Each municipality shall in its own area take care of oil pollution preparedness and response. Besides the owners of different kind of facilities handling big amounts of oil shall have a limited oil combatting ability of their own.

2.2 Combatting responsibility, reporting and operative actions

2.2.1 Responsibilities

The Finnish Environment Institute, a Response Commander (RC) nominated for the purpose by the Institute and under him an On-Scene Commander (OSC) are leading combatting activities on open sea, in public fair ways and also in other areas if the spill is of such magnitude that the local authorities are not reasonable able to cope with it.

Each municipality is responsible for arranging combatting oil spills in its sea and land area and shall have for it a plan. The municipality's Response Commander (usually a fire marshal) is leading an oil combatting action. If a spill is a concern of several municipalities, the regional fire marshal may take the position of the Response Commander for all action and co-ordinate joint efforts of municipalities and regional government authorities. In large land spill situations as well as in beach cleaning combatting action may also be led by the Regional Environment Centre.

Different organizations are liable to assist the Finnish Environment Institute and other above mentioned oil pollution combatting authorities on request. These organizations include: Governmental authorities like the Finnish Maritime Administration, Coast Guard, Defence Forces (especially the Navy), Institute of Marine Research and local oil combatting organizations. Private companies as Salvage companies are also liable to assist with resources at their disposal. There is a special regional contingency plan made for each of five coastal area and for one inland watercourse area. The Ministry of Environment confirms such a plan having heard the FEI about it.

Among other things it belongs to the responsibilities of the FEI to purchase and to develop governmental oil combatting equipment and to decide which combatting methods are to be used. Mechanical removal of pollution is strongly preferred and use of chemicals for oil combatting requires an advance approval of any chemical and a decision of the FEI for each case. FEI advises regional and local authorities on their combatting organization and their contingency plans. Such plans are subjects to the approval whether of the Ministry of the Environment or the Regional Environment Centre according to the scope of such a plan.

When a vessel gets into a situation which includes a pollution risk, the FEI may within the Finnish territorial waters or even outside the territorial waters as the international agreement concerning intervention provide, when it considers it necessary, give an order to undertake such rescue and salvage activities which are intended to avoid or limit the pollution risk. The FEI may also give an order about salvage activities. Before undertaking these activities, the Institute will consult with the owner of the vessel, with the responsible maritime inspector, with the representative of the insurance company in question and with the representative of the salvage company as far as it can be done without causing undue delay.

2.2.2 Reporting

When an oil spill is observed at open sea, the report may be given to the Maritime Rescue Coordination Centre (MRCC TURKU in the Archipelago Sea area) or to Maritime Rescue Sub-centres (MRSC Helsinki in the Gulf of Finland area and MRSC Vaasa in the Gulf of Bothnia area). The report may be given either directly or via coastal radio-, pilot- or Coast Guard stations. The Maritime Rescue Coordination Centre of Turku is also the Finnish National Contact Point for the Pollution Reporting System, POLREP messages.

After a report has been received, the Coast Guard District shall, as expeditiously as possible, estimate the type and size of the oil spill and inform the local authorities and the FEI about measures taken and results thereof. The report concerning a local oil spill may be given also to either the regional alarm centre, port authority or the police.

When pollution of the sea has occurred or when threat of such is present so that any neighbouring country may be affected, FEI, its duty officer shall warn and inform concerned combatting authorities of these countries. The Pollution Reporting System, POLREP of HELCOM messages shall be transmitted also to the Secretariat of the Helsinki Commission.

2.2.3 Combatting activities

Local and government oil combatting authorities and assisting authorities are (even by their own initiative) liable by the law and applying relevant contingency plans to start all reasonable countermeasures against oil pollution. The first measures like containment booming are likely to be done by coast guard units and by the nearest oil combatting boats of municipalities.

The more expertise demanding tasks like big-scale oil recovery and removal of oil from a casualty and even long-term oil spill combatting at sea and on beaches will be undertaken by combined resources representing various authorities. These actions will be initiated, supported and controlled by the FEI and commanded a Response Commander (RC), appointed by FEI case by case. The FEI and the RC and under him a OSC (On Scene Commander) will collect available manpower and equipment, arrange for logistics, decide which measures shall be used for the combatting, etc. The FEI shall decide whether any request for assistance shall be made to the Contracting Parties to the Helsinki Convention.

3. HELCOM Policy and national ability

3.1 Policy

Following the HELCOM recommendation 1/8 (1980) on minimization of the use of dispersants, sinking agents and absorbents the combatting oil spills at Baltic Sea is largely based on mechanical recovery methods because the ecosystem of both the Baltic Sea and its coastal archipelago is highly sensitive. The principal strategy is to skim the oil from the water surface as quickly and completely as possible, so the oil can be reused or destroyed in an appropriate manner.

Other methods may be considered only if circumstances require; the responsible authorities may consider options such as burning or the use of chemical dispersants. These alternatives are indicated if weather conditions prevent the use of mechanical recovery, or if the oil spill presents an immediate threat to a significant natural area. In some Baltic Sea States the use of dispersant is not allowed or out of question in practise. Intentional sinking of oil is generally prohibited.

3.2 National ability to respond to spillages

Helsinki Commission has set criteria for national capabilities to combat spillages of oil and even other harmful substances. HELCOM Recommendation 11/13 (1990) on the development of that national ability recommends among other things adequate response measures and readiness times for them. It also encourages the contracting parties for research and development activities to develop suitable techniques.

Further on the Combatting Committee of the Commission has worked out guidelines (1990) for applying the said recommendation. It emphasizes some planning factors like spill spreading velocity, realistic skimmer performance and need of booms to contain a specific amount of oil at sea. Then it specifies minimum requirements to be demanded for

- containment sea boom lengths, with auxiliary vessels to launch booms and deploy skimmers
- autonomous self driven skimmer ships with the definition of cleaning performance per day in square kilometre
- performance per day of adhesion or suction devices like belt or disc skimmer or weir and vortex skimmer.

The Minimum Requirements of the said guidelines for capacities to recover various persistent oil types are as follows:

1. 2 000 metres high sea booms
2. 2,5 square kilometres of sweeping performance. The calculated area is here based on a working speed of 1-2 knots of the sweeping or skimming vessels. A sweeping area of 4,5 square kilometres has to be fulfilled by those countries which mainly use autonomous driven skimmer ships.
3. 6 high performance sea skimmers
4. Sufficient storage tank capacity at sea for continuous operations.

Each country has been developing its ability according to local conditions, risks involved and other special features. There is also a continuous exchange of

information between the countries concerned on recent technological developments and innovations.

3.3 Finnish approach and preparedness

3.3.1 Methods

Especially Finland's northern geographical location places special requirements on recovery and cleanup methods. Development efforts have focussed on improving operational efficiency at low temperatures and in icy conditions. In practice, the ability to recover high-viscosity oil is a basic requirement. Cleanup operations often take place in temperatures that are below the point at which oil becomes a solid. In these cases, conventional surface skimming equipment designed for the recovery of light oil is inadequate.

Brush technology is a very good oil cleanup method at low temperatures and for heavy oil. In this method, oil-laden water is running through rotating brush units and oil is swept up by brushes . Floating oil and tar balls adhere to the brushes, which are scraped clean. The oil is then pumped into the vessel's holding tanks. Besides its high capacity for mechanical recovery, this method collects only small quantities of water, normally less than 5 %, which is an important advantage. There are various mounting options: the recovery units can either be fitted permanently inside the vessel, or installed at the front or on both sides of the vessel using hook attachments. Even if permanently mounted, these units take up relatively little space, so that the vessel can be in normal use when it is not needed for cleanup operations or oil combatting exercises. Also a rotating brush with a pump inside of the bucket operated by a crane of a vessel or by a typical excavator is developed to be used in icy conditions and for cleaning up oiled shores.

3.3.2 Material and temporal preparedness

HELCOM Recommendation 11/13 (1990) on the development of the national ability recommends among other things adequate response measures and readiness times for them. The Contracting Countries should be able for spillages of oil and other harmful substance

'(i) to keep a readiness permitting the first response unit to start from its base within two hours after having been alerted;
(ii) to reach within six hours from start any place of a spillage that may occur in the response region of the respective country;
(iii) to ensure well organized adequate and substantial response actions on the site of the spill as soon as possible, normally within a time not exceeding 12 hours'

The first responders in Finland for open sea incidents are the patrol vessels of the Finnish Frontier Guard. There is normally such a vessel on patrolling duty on every sea area. Those patrol vessels are able to start measures needed to secure a casualty against further harms like sinking, leaks or fire and also to make the first booming around it. One of those patrol vessels, MERIKARHU is oil recover vessel and able to some missions needed because of a chemical spill, too. Municipalities have about 70 oil combatting boats of a length of 10 - 15 metres and a couple of hundreds smaller boats, whose readiness fulfills two hours demand on coastal waters on ice free conditions. From those municipal boats 12 boats have among other things stiff-brush oil recovery system fitted permanently inside vessel.

Further the Baltic Sea countries should respond to major oil spillages

'(i) within a period of time normally not exceeding two days of combatting the pollution with mechanical pick-up devices at sea;'

In Finland there are eleven Government owned ship-size vessels and 12 boats of municipalities (10 - 18 metres long) with an oil recovery system fitted permanently inside vessel. The vessels are situated along the coast so that theoretically most of the places can be reached by one of them within six hours from start from their home port. There is however some areas outside such an radius and one of the most important shortcomings is the lack of one vessel in the eastern part of the Gulf of Finland.

See figure 1 about theoretical operation radius of six hours for Finnish oil recovery ships. Government's oil combatting vessels with oil tank and sweeping capacities are presented in the table 1.

Because of long distances it takes three days before most of those vessels will be on the same place anywhere on the Finland's response region. Before that, within 12 hours one of those vessels will quite likely start combatting measures in the Gulf of Finland, in the Archipelago Sea or in the Gulf of Bothnia. Then, in general it is quite certain that there is at least one vessel within 24 hours and two vessels within 48 hours in use anywhere on the Finland's response region. Finally, after three days the total sweeping performance of government owned oil recovery vessels is about 14 square kilometres per day (2 knots velocity during 12 hours) and exceeds well the requirement of HELCOM guidelines (4,5 sqkm/day).

Table 1. Finnish Government's vessels with a permanently fitted brush oil recovery system.

Name of the vessel	**Length m/ Tank capacity m³/ Sweeping capacity sqkm/12hours**	**User/Home port/readiness**
HALLI	60 m/1300 m³/ 1,8 sqkm	Navy, Turku/technically 4 hours when in use
HYLJE	54 m/800 m³/ 1,8 sqkm	Navy, Upinniemi/technically 4 hours when in use
MERIKARHU	58 m/40 m³/ 1,4 sqkm	Coast Guard of the Gulf of Finland, Helsinki/instantly when at sea (2/3 weeks)
LETTO	43 m/43 m³/ 1,4 sqkm	Maritime Administration, Oulu/daytime in working days
LINJA	35 m/79 m³/ 1,4 sqkm	Maritime Administration, Pori/daytime in working days
SEKTORI	33 m/108 m³/ 1,4 sqkm	Maritime Administration, Maarianhamina/daytime in working days
KUMMELI	28 m/70 m³/ 1,4 sqkm	Maritime Administration, Savonlinna/daytime in working days
OILI I	24 m/79 m³/ 0,9 sqkm	Maritime Administration, Helsinki/daytime in working days
OILI II	24 m/79 m³/ 0,9 sqkm	Maritime Administration, Turku/daytime in working days
OILI III	24 m/79 m³/ 0,9 sqkm	Maritime Administration, Maarianhamina /daytime in working days
OILI IV	19 m/30 m³/ 0,9 sqkm	Maritime Administration, Vaasa/daytime in working days
TOTAL	/2700 m³/14 sqkm	

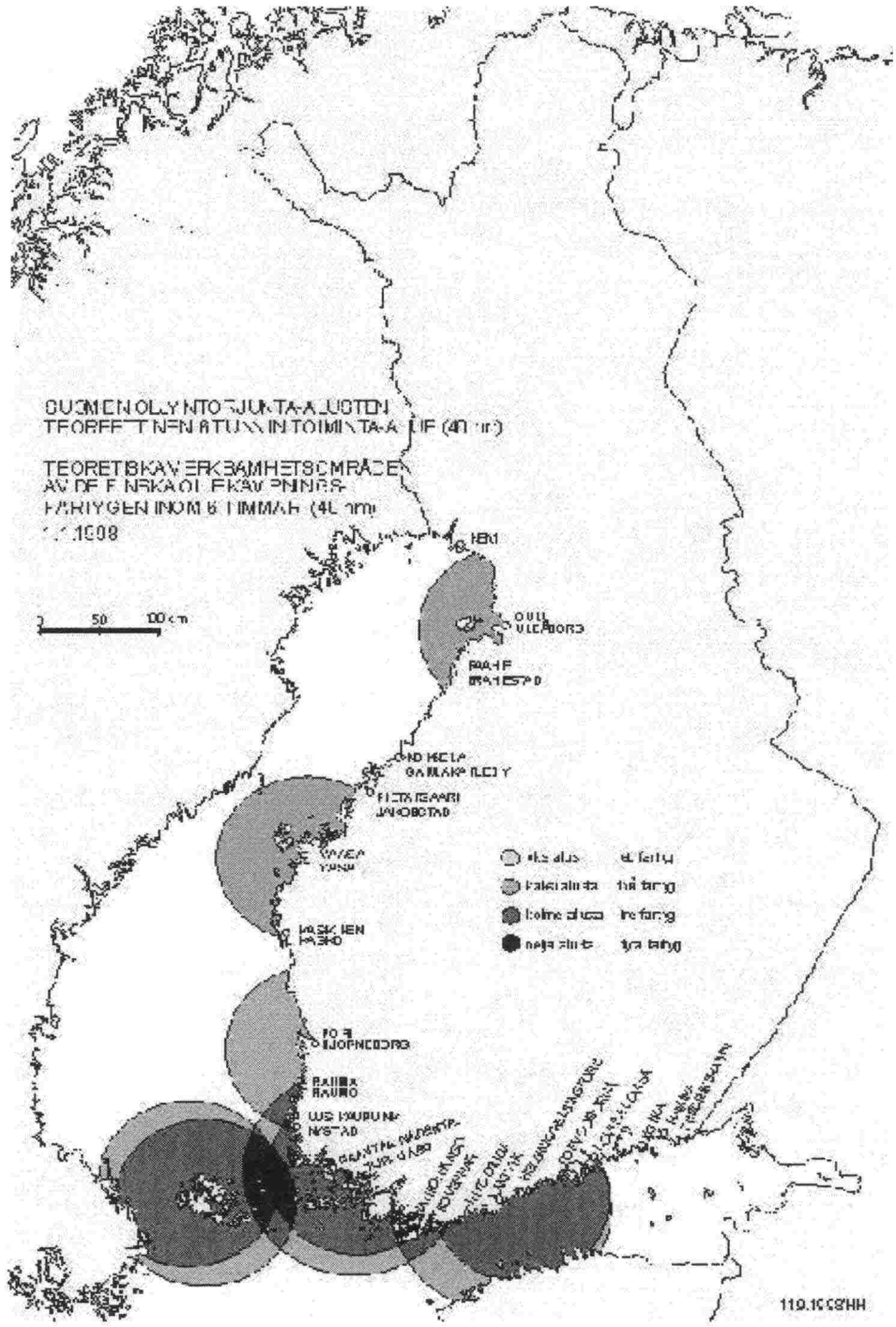

Figure 1. Theoretical operation radius of six hours for Finnish oil recovery vessels.

Finland also fulfills other Minimum Requirements of the guidelines for capacities to recover various persistent oil types. It has 2 200 metres high sea booms and 24 high performance sea skimmers and those vessels have together 2 700 cubic metres storage tank capacity for instance.

Finland's ability to respond to spillages of harmful substances other than oil bases on two specialized vessels, Merikarhu and Telkkä and on the chemical spill combatting capabilities of municipal fire brigades, mainly. There is in the first place a need of a vessel with liquid chemical cargo lightering capacity of 600 - 800 cubic metres and some special equipment containers. Underwater technology has been an item of research and development activities and some technical readiness exists to recover sunken chemicals from the sea bottom.

Finland continues development and improvement of the combatting services, taking into account as special relevant factors especially the length and configuration of the coastline, ice conditions, vulnerable ecological areas, probability of adverse weather conditions etc. One priority in recent R&D projects has been to develop better methods for oil recovery in icy conditions. As a result an equipment was delivered to the National Board of Waters and the Environment in spring 1991. In trials in the Gulf of Bothnia, the 'ice bow' successfully collected heavy fuel oil from an ice mass.

Mechanical collection of oil and handling of oil on the spot has traditionally been facilitated by means of various absorbing materials. At the present, bulk absorbing materials are being replaced by the use of mats and other objects which are easier to handle. Use of absorbing materials as such increases the amount of oily waste. In the open sea, it is not allowed to use any sinking materials, and mostly only absorbing booms to remove thin oil films are allowed for.

The environmental pollution protection has in Finland in the last years been developed to respond to the many challenges arising in different situations. In practice, the know-how has been applied in many incidents like

- Localization of waste barrels thrown into sea over ten years ago and covered by bottom mud (Dragsfjärd barrels 1993), and lifting them without leakages (1994).
- Collection of oil from an oil tanker lying on the ground (MT 'Kihnu' in the Estonian coast 1993): 1 070 tons of heavy and light fuel oil were transferred ashore by means of a hose carried by a helicopter.
- Pumping of oil out from broken bottom tanks of a dry cargo carrier lying on the ground (MS 'Pamisos' in the open sea north of Åland 1992, carrying 23,000 tons of fertilizers): 320 tons of heavy fuel oil were preheated and removed by vacuum suction through the air pipes. Later similar cases of MS 'Fin Master'and MS 'Oihonna' in Kotka 1995: heavy fuel oil was removed from broken bottom tanks before docking.
- Divers assisted removing of heavy fuel oil from a wreck: 260 tons of oil were pumped in years 1994 - 1999 from MS 'Park Victory''s wreck sunken 1947.
- Remote controlled oil removal 1996 from the wreck of the ferry 'Estonia' sunken 1994: 230 cubic metres of light and heavy oils were removed using underwater robots from 15 tanks of the wreck laying deeper than 60 metres.

Two of the tanks were behind two walls. All walls were penetrated by the 'hot tap' method, doing connections in a closed way.

- Preventing the casualty from sinking by using an emergency pump system carried on board by a helicopter (MS 'Transgermania' in Utö 1990 was saved from sinking: leakage from MS 'APJ Karan' north of Åland 1991 was under control).
- Collection of oil from the water in the open sea (MT 'Volgoneft' outside Karlskrona, Sweden, 1990): nearly all leaked waste oil was collected from the sea, over 80 % of the total of 1,000 tons by using a Finnish invention. Most of the oil, 240 tons, was collected by the oil recovery vessel 'Halli' which arrived last to the casualty.
- Collection of oil from the water on the coast (the lighter system 'Finn-Pusku' capsized and was later turned around in Hanko 1991): heavy fuel oil leaked into the sea was collected by two oil recovery vessels.
- Since March 1987, oil pollution protection safeguarding in connection with sea salvage operations of altogether 50 casualties none of which resulted over ten tons of oil waste to be collected from the shore (March 1, 1987 - 10 September 1999).
- Material assistance in the oil combatting operations in Alaska (MT 'Exxon Valdez' 1989) and in the Persian Gulf (war 1991).
- Register of dangerous wrecks (about 500 wrecks registered in 1996), a risk classification of the wrecks in the register (1998) and investigation of wrecks at risk.

In addition, work is still being done to develop methods to be used in submersible renovation work, oil spills in fast ice field conditions, oil transfer pumping at sea and bioremediation. An international conference on oil pollution protection in ice conditions took place in Finland in the end of 1992, and a practical 'Oil in Ice' exercise for Baltic sea countries was arranged in Oulu in early spring 1994.

All development in this field starts from the idea that prevention of environmental accidents at sea is successful when no harmful materials end into the sea. Success is halfway when such material is collected from the sea. If the material remains in the nature or if it is collected from the shore, the operation can be considered nearly as a failure.

However the enormous amount of manpower and hand work, that is still needed in clean-up of oil polluted shore line, is also a problem requiring salvations. As one step for that also a self propelled amphibian excavator with a pump in its shovel is modified and equipped on August 1996 with a rotating brush to collect oil at shoreline or in difficult attainable wetland.

4. Applications of technology to use

At sea, planning the oil combatting operation requires follow-up and forecasting of the spreading of oil. Short-range trailing takes place from the vessels and helicopters, and the more extensive surveying can most effectively be done from a special surveillance aeroplane. The spreading of oil can be forecasted on the spot by using 'field' PC's, and for a more detailed evaluation there are more extensive expert models.

In order to salvage the casualty and her cargo and to prevent environmental damage caused by the accident, it is vitally important to find out what exactly are the damages suffered by the casualty and in what condition the cargo is, to understand their effect on the behaviour of the casualty and on the leakages, and to select and take appropriate measures. All cases are different but there are certain common features and needs. If the casualty lies on the rock, she has to be refloated without being capsized or sunk and without oil leakages. When afloat, leakages into the casualty have to be controlled to stabilize the casualty and to prevent oil leakages during transportation.

The casualty's damages can initially be judged on board the casualty mainly by sounding the tanks and by surveying accessible spaces. Next, the breaches and indents in the bottom can be inspected by diving. If the casualty is grounded, the inspection under the water can be done only for those parts where the bottom can be seen. Movements of the casualty (effect of swell, changes in the casualty's position) may restrict diving surveys as the safety aspect has to be considered. More detailed survey of the bottom is possible when the casualty is afloat but, even then, pumping may expose the divers to the risk of being stuck.

Most of oil leakages take place immediately after the accident. The casualty's own fuel tanks, which are wholly under the water line, leak into the casualty, if broken. Major outward leakages are caused by large cuts in the bottom tanks, vertical tanks reaching over the water line and seldom to the bottom, or by leaking cargo tanks of tankers. In case of grounding, the situation usually becomes stable so fast, normally within one hour, that it cannot be influenced by any means. As soon as the tanks are in balance, no considerable leakages out take place, except if the position of the casualty changes, water level is lowered, or heavy sea rises. The only task is to prevent these leakages as the casualty is refloated and transported to a safe place. Not only oil but also other cargo may cause a risk of environmental damage and complicate the salvage of the casualty.

Sometimes it is possible to survey systematically and exactly enough the broken tanks of a casualty which is floating free. For necessary strength calculations, the insurance companies and classification societies require that the bottom surveys are done in an adequate manner by a diver approved by the classification societies. If permitted by the circumstances, the broken bottom tanks are temporarily patched before transportation. Wooden wedges are traditionally used for small holes and durable carpets sheets or even different underwater hardening materials. For patching big tears requires welding cover plates over holes and dented areas surrounding tears. If this is not possible, the casualty is towed to a safe harbour with minimal speed.

A sunken wreck may require urgent measures because of oil leakages or some other reasons, too. Then similar technic as used for oil removal in groundings is applicable there too. Besides equipment and method for penetrating walls and other obstacles for pipe connections are needed ('PARK VICTORY' 1995 daily tanks in the engine room were emptied through 'hot tap' connections. In the 'Estonia' case, 1996, two deep heavy fuel tanks on the tank top were connected through the bottom plate and through double bottom by aid of so called 'double bottom tools').

Oil removal from sunken wrecks is feasible to do with divers down to 60 metres depth. Deeper than that special, so called saturation diving technology is needed. Divers are pressurized for a working stage, for instance one week's time. Because of big pressure chambers, diving bells or submarines and a special base ship, system is very expensive. Then an alternative is to use remote control technology for oil removal ('Estonia' 1996)

5. Future prospects

5.1 Methods

There are plenty of weak points in the oil combatting technology, still. Darkness, adverse weather conditions, ice, oil's tendency to spread rapidly at water surface and to stick fast to rigid materials are main challenges, perhaps.

For many reasons, it is quite likely that an oil spill occurred at sea will become a disaster ashore. Therefore we should now look at possibilities to develop cleaning methods for shorelines, too. If there would be such mechanical devices, which apply to recollect, efficiently enough, main amount of oil on various types of shoreline without harming environment, a remarkable amount of handwork and money may be saved.

The outstanding development of computer and communication technology offers many applications to oil combatting, too. Satellite localization and communication, computer aided navigation, wireless image transfer and different near and remote sensing technology may help to have real time positions of strike teams and even of oil showing on a same screen.

Although the mechanical recovery of spilled oil from nature is the method, that is most unanimously accepted, it is not always feasible. All other methods may be more controversial, but they can often fulfil the caps, which leave outside reach of mechanical collection methods. For instance a bioremediation is always the final cure by nature to the environment. In what extent that or other controversial methods like dispersing or burning shall be applied, varies case to case, inevitably. Therefore, little by little we will have more knowledge from research to be able to select optimal tools to overcome oil pollution.

5.2 Keeping casualty figures low

Sea traffic in the Gulf of Finland has almost doubled during the last five years being in 1998 about 80 million tons of cargo where about 40 million tons were different oil cargoes per year. It has been estimated, that sea traffic will be twice so much in 2010 in the area; 160 million tons of cargo including a share of 80 million tons of oils per year.

With the growth of sea traffic also the probability of oil spills may be doubled, if a level of precautionary measures against accidents will stay as it has been. If the occurrence of oil spills in the Gulf of Finland would be the same as it was estimated in a HELCOM study in 1995 and 1997 for the Baltic, it means that after the year 2010 there will be about 6 - 7 oil spills per year in the Gulf of Finland.

Main amount of those spills will be about some ten tons of oil consisting spills caused by bunker oil of all types of vessels. Maximum size of those bunker oil spills will be 100 - 200 tons. Probability of a cargo oil spill of a single hull tanker will be once per year and an oil spill caused by cargo oil from a double hull tanker accident will occur once per four year. Size of cargo oil spills varies from some hundreds of tons till thousands of tons of oil.

Other kind maritime pollution incidents will keep quite rare when compared with oil spills. A chemical cargo leak from a tanker may occur once per six year in the Gulf of Finland after 2010. Chemicals in packages will go over board about twice per year, but a serious accident of a ship carrying such a cargo will happen once per two years, only.

The said estimations seems high when compared with the real occurrence of pollution incidents since last ten years in the Gulf of Finland. Estimations were based on an old statistic from era before nineties, when spills were of a higher occurrence than later in the Baltic Sea. For checking it seems to be needed to compare an average global spill occurrence with the spill occurrence in the Baltic Sea.

According to International Oil Spill Statistics 1998 in the world it has occurred oil spills of over 10 000 US gallons (>34 tons) during last eight years 1991 - 1998 about 23 oil spills from oil tankers and about 21 oil spills from other vessels in average per year. In the year 1996 the global maritime transport was about 4.8 milliard tons including 2,3 milliard tons liquid bulk and 2,5 milliard tons dry cargo. In the year 1997 through the Baltic Sea ports was transported about 518 million tons of cargo. So the share of the Baltic Sea from the global maritime transport was about 11 per cents and the share of Finland about 1,7 per cents when measured as cargo. Corresponding shares from oil spills would be 4 - 5 oil spills per year in the whole Baltic Sea and in Finland an oil spill between 16 months. In the reality oil spills of magnitude over 34 tons has occurred in the Baltic Sea much less, about 1-2 oil spills per year and in Finland one such an oil spill every 39 months (four oil spills in Finland during last 13 years).

Why the spill occurrence in the Baltic Sea and especially in Finland has been so little? Broken and shallow coastal zone in the northern and western coasts and sometimes difficult weather conditions requires a comparatively high level of maritime safety. Long fairways through the archipelago are well build and marked. Land based radar network covers the coast and use of the pilotage service is obligatory. Merchant vessels are quite new and with a modern navigation equipment. Tanker are normally with double bottom. In spite of all that casualties like groundings occur frequently, but consequences of them are not normally very bad. Because

of the generality of casualties the authorities and private companies get often practise and keep trained to overcome practical difficulties. Salvage and pollution combatting are initiated promptly and in order to prevent all leakages during refloating.

Maritimeconditions for some of new planned ports are quite challenging ones. The growth of transport emphasizes needs of land based vessel traffic service and automatic identification systems as well as an efficient preparedness for salvage and pollution combatting. Double hull tankers and escort service for big tankers in fairways are also ways to keep casualty and spill figures low in the Gulf of Finland in the future, too.

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OIL SPILL CONTINGENCY PLAN OF RUSSIA

United state system of prevention and liquidation of extreme existing in Russia, combines management, forces and means of Russian Federal authorities and Local administrations. Oil spill contingency plan of Russia is a part of general system of liquidation of extreme situations.

The realisation of operations of liquidation of emergency oil pollution in sea areas is assigned to State Marine Pollution Control & Salvage and Rescue Administration (SMPCSRA) that working in sea areas through the sea salvage companies. The Baltic Salvage and Towage co. (Baltic Tugs) is a such company In Russian Baltic regions.

The realisation of works at the sea is carried out by forces MPCSRA with attraction in case of need, of forces of other organisations of transport, other departments, and also forces of foreign States, according to the international agreements of Russia. The realisation of works in ports is carried out by administrations of ports and operators of terminals, with attraction of the salvage companies on the basis of the contract. The realisation of works in a coastal zone, on a coast and shoals should be carried out by local authorities, where there are special extreme situations commissions

According to the plan, the primary information on actual pollution of oil in the sea acts through MRCC St. Petersburg in the Baltic Tugs which directs the response units to the place of spillage. The decision on attraction of additional forces, first of all - tankers for transportation of collected oil, accepts the Baltic Tugs. The decision on attraction of necessary foreign forces accepts MPCSRA.

In case of actual pollution of oil more than 500 tons, or at impossibility, on what or reason, to liquidate of major oil spillage by forces of the Baltic Tugs, are going a Staff of a Management (manual) of Operation under the direction of the assistant of the Chapter of Local Administration.

The conditional size of max. possible spillage is accepted in plan at the rate of the tanker by displacement of 40 000 tons and is determined at a rate of up to 3 000 cubic meters of oil. The methods of combating the pollution are based on the equipment, available to the company, of partially out-of-date types.

Many organisations specified in plan by way of co-operating existing earlier have stopped the existence owing to bankruptcy. The basic deficiency of the existing plan is the absence of participation of Naval forces and units of a Frontier guard in a readiness as response vessels.

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Oy EDI Management Finland Ltd

COST 330

1. Teleinformatic profile of the port community partners

1.1 Use of software applications

The average use of software applications within the port communities is seen as relatively low, although most of the port authorities use invoicing and statistics applications. Other software applications among port authorities, port operators/stevedoring, forwarding and trucking companies are found to be common in less than half of the participating communities. Railway companies and customs show, at their national level, higher use of basic software applications.

Some small port community partners seem to manage successfully without any IT, or with minor IT, to run their business. But inevitably the need for IT will increase rapidly as soon as there is a demand for more services and/or better quality from the clients' side.

Big port community partners in large ports normally have all available IT solutions. These companies are also participants of the European R&D programs which help them improve and implement the newest available technologies. In the terms of IT levels, the gap between large and small companies in the port communities is currently big, and may grow even bigger.

The inland waterway ports show lower use of IT than the seaports: and thus can be compared with small sea ports in their level of IT use. In most inland waterway port communities which are mainly small, the number of partners is generally very low, only one or two. For these historical reasons, one port community partner in inland waterway ports has fulfilled all the port community partner's roles. It seems also that most of the inland waterway ports which have handled mainly bulk cargoes normally do not need a high level IT. It is seen that the volume of general cargo is increasing in the inland waterway ports: this will increase their demand for new IT solutions. Interestingly, the sailing frequency in the inland waterways demands that VTS applications are used in many inland waterway ports.

1.2 IT platforms

Middle size hardware platforms and client/servers are common among all port partners. The use of mainframes is much higher among centralised organisations, e.g. customs authorities and railway companies. Stand alone PCs are a common solution among trucking companies and smaller ports.

1.3 Software supplier, software maintenance and support, outsourcing

When necessary, software applications are purchased from external suppliers and also maintained and supported by external service companies. This is common in half of the port communities in the sample; logically, this rate is higher (80 %) when looking at the forwarders and truckers, as it correlates with their lack of IT staff. Software development, maintenance and system operations are, however, more time consuming for IT staff, because these activities are not generally outsourced. This trend seems to continue in the near future, except among inland waterway port communities, where the outsourcing may increase.

Outsourcing is not very high in the port community companies. The port community partners tend to keep the IT in their own hands and under their own control - but at the same time they are unsatisfied at not having enough IT to resource the necessary IT development and external interconnectivity. This finding is in contradiction to the levels of outsourcing of IT in other economic sectors, even in the IT industry itself.

1.4 IT staff

Economy of scales can be implemented for the port community partners. IT staff among port community partners is relatively small, this is seen strongly in the forwarding and trucking companies, probably due to their small size. Many small port partners have normally less than 5 persons in their IT staff meaning that most of the partners have only one person in charge of IT activities, maybe even using part-time staff. These partners are without any deep capability to produce value added services for their port clients.

1.5 Problems in IT

The small companies feel also that their telecommunication infrastructure is not sufficient for their purposes and also expensive. Perhaps this is evidence that the SME partners do not have enough know-how in telecommunications. Small trucking and forwarding companies obviously also miss vital knowledge to implement modern IT systems, and maintain their operation.

All partners agree that old software is, with old hardware, the main problem hampering their development of IT. Small and medium port community partners also highlight that telecommunications are expensive; the lack of telecommunications infrastructure is also reported to be a relevant problem within inland waterway port communities.

1.6 IT value added services

Some port community partners (port authorities, port operators/stevedoring companies) offer value added services (for instance tracking and tracing) to their clients. Companies who are producing value added services normally need a higher level of IT in order to manage the logistics information. Naturally, those companies who are not producing value added services for the clients do not need high level of IT.

It is obvious that low use of IT will force some port community partners to loose or to change their role. Companies with high IT levels are able to produce value added services for their clients and will achieve a more dominating role in the logistics industry.

1.7 Level of EDI - paperless message exchange

Having in mind the pictures described previously, it is not surprising that EDI is not widely implemented within port communities. Only 26 % of the 106 port communities, stated that they use EDI, but EDI hardly exists within the inland waterway port communities. Given the profile of port communities participating in COST 330 Action probably implies that the general proportion of European port communities using EDI is not much higher. This is based on the fact that the ports participating in the Action covered over 60 % of Europe's trade.

EDI is most frequently used by the port authorities and port operators/stevedoring companies, followed by shipping agents and forwarders and - without any use in our sample - trucking companies. In half of the participating countries the customs authorities are highly concerned to use EDI; the opposite is the case for railway companies. Trucking companies do not have any EDI contacts with the ports (in our sample). However, the trucks carry 65 % of the cargo flow to and from the European ports. The biggest trucking companies have EDI contacts with their clients in the hinterland.

The forwarding companies mainly use EDI with the customs authorities. The forwarding companies are using EDI only for the administrative purposes, not for their value added services. However the driving force of EDI may change within each port community partner because of the re-organisation of the port system in each country as they move towards liberalisation and increased competition. In some port communities the port authorities seem to be the first driving force for the EDI development, customs authorities being the second. Thus these authorities may play the driving role for promotion and use of advanced IT mandating the use of Edifact-based EDI applications for customs declarations, Hazmat information, and the collection of statistics at the European level. (Edifact is an international standard for message structure.)

The port community partners are currently using a greater number of non-Edifact than Edifact messages. The partners have, however, expressed their willingness to adopt standard Edifact messages in future developments: this may be because Edifact messages are obligatory for example for the customs and Hazmat authorities.

For various reasons it may be difficult to implement Edifact messages in the small and medium size port community companies. For instance, port communities may use different Edifact messages or subsets of Edifact for the same purposes. These local implementations may thus become a barrier against interconnectivity between partners in different port communities and countries.

Another reason for the more frequent use of non-Edifact messages in stevedoring companies is explained by the fact that some stevedoring companies have often been receiving cargo information from the industry in hinterland (forestry, car, etc.) using industry-specific messages for many years before Edifact was taken into use. They thus wish to remain with the familiar rather than waiting for a new standard to be developed.

The most frequently used Edifact messages are: CUSREP, BAPLIE, IFTDGN, CUSDEC, and IFCSUM. The same messages are also planned to be used by the port community partners. The main EDI applications are cargo manifest and declaration, cargo booking, stowage plans and - probably moved by the Hazmat Directive - some dangerous goods information.

There are two ports which have reported that they will stop the EDI development and concentrate the development to Internet/Intranet. Generally however, the SME port community partners consider that EDI, Edifact and telecommunications are confusing.

1.8 Port Community Systems

In large ports their Port Community Systems (PCS) are providing EDI for their partners in waterborne and intermodal transports in the sense of paperless message exchange (see application layer 1 in Section 7.5 below). These systems are supporting EDI services in the large ports to their port community partners. Partners in sea port communities are almost equally in favour or against PCS. Despite having a low telematics profile, PCS are not considered interesting by the inland waterway port communities. Port authorities express their strong willingness to be a shareholder in a PCS company - thus further development of the PCS infrastructures should continue.

Normally the Port Community Systems provide specific standards at the application level, thus users have to develop and install software on their premises for 'bridging' their in-house EDP systems to the specific standards of the Port Community Systems. Even if Edifact were accepted widely, there would still be a problem to link existing internal EDP systems to EDI in Edifact format. Happily the standard Edifact offers some possibilities for special agreements to be provided individually.

Within the *EDI users* community software and hardware is not perceived to be a major problem compared with the *non-EDI users*. This may be because they already have expend adequate effort on their IT systems before EDI implementation.

The main problems areas in message exchange for all partners who are *using EDI* in the sea port communities are the perceived complexity and the lack of cost/benefit relationships of EDI projects. Half of the all sea port communities partners *not using EDI* feel that they would have problems in message exchange.

The use of EDI within the port community is not reported to increased significantly in the short term. However port community companies may prefer to focus their investments in alternative IT developments where they perceive a higher added value. In this respect, preferences are put upon new software applications, new operating systems and hardware, Internet and other means of communication - like mobile and satellite communication.

The use of an EDI agreement varies very much from port to port and from country to country. The experienced EDI port community partners normally make an EDI agreement with their EDI partners. Partners in small and medium port communities do not have EDI agreements.

1.9 Use of Software application for Dangerous Goods Information Management

Dangerous Goods Information Management has been mainly handled manually - probably because there has not been any common European or even national electronic procedure for handling this kind of information. The Hazmat Directive will be one of the driving forces in implementing new telematics as general.

1.10 Use of Internet/Intranet

Port community partners had a low use of Internet/Intranet by the time they answered the questionnaire and the great Internet revolution was yet to come. Most likely Internet will raise the IT level of small and medium size port companies. Allegedly the IT industry is generating masses of new business by new Internet applications. At the same time it may mean new and cheaper solutions for the SME companies.

Internet applications have high priority among all port companies, even among EDI users. The use of Internet is growing very rapidly in the communities outside that of the ports. In the sample of ports the respondents saw Internet mainly as a communication tool for E-mail and yellow pages information and to lower cost of telecommunication. However it must be noted that some of the data sample of COST 330 is now a couple of years old. And by 1998 the perception of Internet and its use has grown - thus ports and partners are likely to increase their use of Internet, Intranet and so on, for detailed trading purposes.

1.11 Improvement of the port community telematics

Improving the IT level is dependent on individual companies and on market forces. Software companies may find that the IT market of, for example, the trucking and forwarding companies is not big enough to attract them. Also, small companies if they have an IT base have many tailor made software solutions which need heavy investment to upgrade their interconnectivity features for EDI, or for Internet. These investments are regarded as too expensive in the small port community companies.

There is an obvious awareness within the port community partners of more powerful and user friendly IT solutions which may be available, in the market-place, but due to the small number or lack of their IT staff the adoption of new solutions is, or will be, very slow.

2. Recommendations

In studying the following recommendations we should remember that many ports are interconnected by their physical logistics movements, and also in terms of the data they need and utilise. Similarly we proffer concepts such as 'harmonise' or 'openness and transparency' on the understanding that the supply chain management requires the co-operation of many agents who act between consignor and consignee, and they use many integrated services, some of which are electronic, but many remain manual processes. The proposals thus embrace plural concepts as well as supporting the idea of 'one-stop-shopping' - as in the use of telematics. They also cross the boundaries of many Directorates in the Commission.

We consider that telematics systems must support all ports in the future: but at present, some ports will require heavy investment in hardware, software, and in their human resources capital in order to adequately join the digitally mediated logistics chain. Other port communities appear to be further along the development curve. It is not our intention here to be critical or to applaud the currency of telematics in ports, but to propose actions to develop a coherent telematics future which will support global trade.

2.1 The audience

The recommendations are based on the analyses and findings of the COST 330 Action. They are targeted at the following audience:

- The European Commission
- The National Authorities
- The Port Communities and their partners
- The European Transport and Logistics Sector

The main areas covered by the recommendations are:

- Harmonisation of the working routines
- Port Community Telematics
- Training in the use of Port Community Telematics
- A real standard for data content
- Inland waterway ports: developing their role in European logistics
- Harmonisation of legal rules and instruments for Electronic Commerce

2.2 Harmonisation of the Working routines and processes of the Port Community Partners

The harmonisation of the working routines of the Port Community Partners is indeed a global problem. To an extent it can be solved on a European (including global), national, individual port and at the European logistics industry level.

In order to reduce redundancy in data and message handling the current, non-harmonised, working routines which create extra work for the port community partners need simplifying and standardising in the way that has been accomplished, for instance, within the air freight industry.

2.3 Port community telematics

The Port Community Partners should be encouraged to make greater investments in their IT development (at least 2 % of their annual turnover) to create a competitive tool which will improve their business. A clear model is needed to help evaluate the cost-benefit of IT investments for the 'Small and Medium Enterprise' (SME) Port Communities as part of their logistic supply chain so that the implementation of modern IT could be completed much quicker than today. Port Telematics should also be regarded as one of the critical quality factors of the Port Community Partners, which, once in place, will add value to their services.

The Port Community Partners should understand their role in the supply chain management. This is where the Port Community members could offer unique 'one stop shopping' for the supply chain. They could offer many IT services to benefit their smaller partners, and all would benefit by this co-operation. Given there is increasing competition in the cargo logistics sector and the Port Community Partners should develop new value added IT services for their clients.

2.3.1 Port Community partners, software applications

New, easy to use, modular software applications which support the daily working processes should be developed, especially for the Port Community SME Partners to enable them to use and modify the software applications without creating huge IT departments. The software providers should offer reasonable services for this purpose and outsourcing at least for the smaller partners should be the target. IT should be brought closer to the Port Community SME Partners than is currently the case.

There is no clear market leader in Port Community software applications and/or outsourcing in Europe.

2.3.2 Port Community Systems

The existing Port Community Systems should be redesigned to be 'right-sized' (a term indicating the appropriateness of the functionality of the software and hardware applications, capital investment and user costs) for the small and medium Port Communities.

2.3.3 New IT services based on Internet technologies for the Port Community Partners

The Port Community Partners should develop new value added IT services based on the Internet technology - provided that Internet guarantees safety and security of data transport. There may be new joint applications which several port community partners are using simultaneously - thus Internet services based on EDI should be considered seriously. There is a large potential for IT service companies to offer and host these new applications on an outsourcing basis since, currently, outsourcing in the ports communities is low compared with global averages in the IT-related sectors. European R&D activities should be targeted to support new IT services based on Internet technologies.

2.3.4 Inland waterway ports, Port Community Telematics

Port Community telematics infrastructures should be developed specially for inland waterway ports in Central and Eastern Europe. There is a need for programmes to promote the co-operation (not only in telematics) between West European and East European sea and inland waterway ports. And to support links such as the development of the Rhine-Maine-Danube as a potential highway for trade.

2.3.5 European R&D programs

The European R&D programmes seem to concentrate mainly on the discovery of and development of leading-edge technologies described as pre-commercial research. The participants in the subsequent development of these R&D projects normally are larger companies which have the means to implement the latest technologies.

Thus it would seem that the Port Community SME Partners do not have the technical and human know-how to implement the latest technologies and are seldom able to participate in European R&D programmes which are too complicated to understand, and getting a feeling for them is complex and slow.

It is suggested that a special R&D programme in Port Community IT for the Port Community SME Partners should be undertaken - having as its main objective the development of easy-to-use applications for the Partners. This should take place within the global, European, and national level of telematics development programmes.

Further - there should be EU Initiatives or Actions for the definition of the strategy for IT user-technologies and know-how for Central and Eastern European countries which are newcomers to the EU: this should be extended to the MEDA countries.

2.3.6 National R&D programs

At a national level, the needs of the Port Community SME Partners should be included in the national R&D programmes.

2.3.7 Green logistics telematics, green telematics

The port community telematics should be of assistance in moving cargoes from land to sea (and vice versa). Flexible and easy-to-use software applications will attract more cargoes to maritime transport - thus may help keep the cargoes afloat rather than transhipping to road haulage.

2.3.8 Who are the driving forces of IT development in the Port Communities?

A new study could be initiated in order to find out who are the driving forces in the development of Port Community telematics. These groups may be persuaded to co-ordinate a broader programme of integration of all partners in ports - large, medium and small - across Europe.

2.3.9 Technology transfer between European port communities

In many cases the success stories of IT implementations are more illustrative than the results from highly advanced R&D programs. Disseminating these success stories more widely may promote a much more open and transparent development of the logistics sector.

2.3.10 Quick and complete opening of telecommunications infrastructure

Demonopolisation of the telecommunication infrastructures (as per the 1st January 1998 target) and the opening-up of telecommunications competition should lead to cheaper telecommunications costs in all European countries. There should be a lower level of telecommunications charging among the Port Community partners because this form of communication is an essential base to the port community telematics (as part of the transportation chain) both in inland waterway and sea ports, and thus the stimulation of trade.

2.4 Training

2.4.1 Modern IT know-how and implementation for Port Community SME Partners, Inland waterway ports - IT awareness training

The port community partners in inland waterway ports do not possess enough know-how about modern IT and its implementation. There should be a possibility to transfer the know-how by on-site training. This should include information on both hardware and software, the latter should cover both operating systems (e.g. Windows NT) and application modules. Application requires easy-to-handle procedures to modify the provided packages into tailor-made processes.

The inland ports have about 10% lower level of applications use than the sea ports, on average; and a lower level of human resources applied to supporting and developing their IT. It is vital to develop their skill base to allow them to be integrated in to the IT mediated logistics chain, thereby alleviating the pressure to utilise still more road haulage.

2.4.2 Training of the SME port community partners

The port authorities seem to have longer IT experience and deeper knowledge of general IT development among the port community partners. Their knowledge and experience should be used to benefit other the less advanced port community companies thereby distributing better information and intensifying the awareness of port related IT know-how, solutions, etc.

In some port communities the port authorities seem to be the first driving force for the EDI development, customs authorities being the second. Thus these authorities may play the driving role for promotion and use of advanced IT mandating the use of Edifact-based EDI applications for customs declarations, Hazmat information, and the collection of statistics at the European level. (Edifact is an international standard for message structure.)

A joint IT discussion platform in each port community would create a new route to better and more open discussions between the port community partners. It is shown elsewhere that openness and transparency of operations is of benefit to the whole community - the port community should be no different in principle.

Profound and targeted training should be addressed both to the management of all port partners and to their IT staff in order to improve the perception and use of IT.

2.5 EDI, Edifact - Standardised data content

Aiming at the improvement of the economic benefits, and to increase quality and reliability, the software applications have to be interconnected via automatic EDI by mandating interoperability between the data processing of various applications via automatic file transfers.

The Port Communities should promote the use of electronic communications between the partners by giving discounts in the costs of information delivered electronically (EDI, Internet, etc.) and maybe even offering a free service for their local partners over Internet.

A real standard for data content is needed at the global level. A simple and universal data content standard would help in implementing EDI solutions. Some discrete standard solutions based upon Internet technology have already been developed but, as always, because of the fragmented nature of the logistics chain the application of these is not universal.

For the small and medium sized partners (SME) in a port community a co-ordinated community approach is necessary to address the needs of the low-tech partners who do not have the EDI capability. For some, only Web access to a Web based PCS may be sufficient, others may need a more extensive EDI interface for interrogation and some file transfer, others may need full interface and full file exchange. Only a local PCS with modern technology can provide the local solution tailored to meet the specific needs of their partners.

Using low cost, standard off-the-shelf components together with modularised functional software modules for the main business functions eg. Manifest transfer, etc. and other general areas which are standard in all ports, then the local and specific needs could be customised.

Once again it is seen that a more open interchange between the Port Community Partners is needed. This can probably be achieved through the use of the Internet given its common communication infrastructure, data content and format. The new programmes of the European Community and the European Port Communities should be targeted at improving the global standardisation of messages for the common good.

2.6 Inland waterway ports, part of European cargo logistics

The European inland waterway ports do not have at present a large role in cargo logistics transhipment. These ports should be linked more closely to all European R&D activities so as to develop their potential across many sectors - in logistics, in telematics, and in human capital development.

2.7 Harmonisation of legal rules, instruments for Electronic Commerce

Harmonisation of the rules of Electronic Commerce should be sought at the European level if not the global level. The lack of common legal rules is considered to be one obstacle against using EDI and/or Internet as transmission tool in the European logistics industry. This is a particularly difficult legislative area - but it must not be ignored. Nor should regulation be allowed to be developed elsewhere to the detriment of European trade.

COST 330 – Telematic links between ports and their partners

Participating countries

16 European countries (19 total):

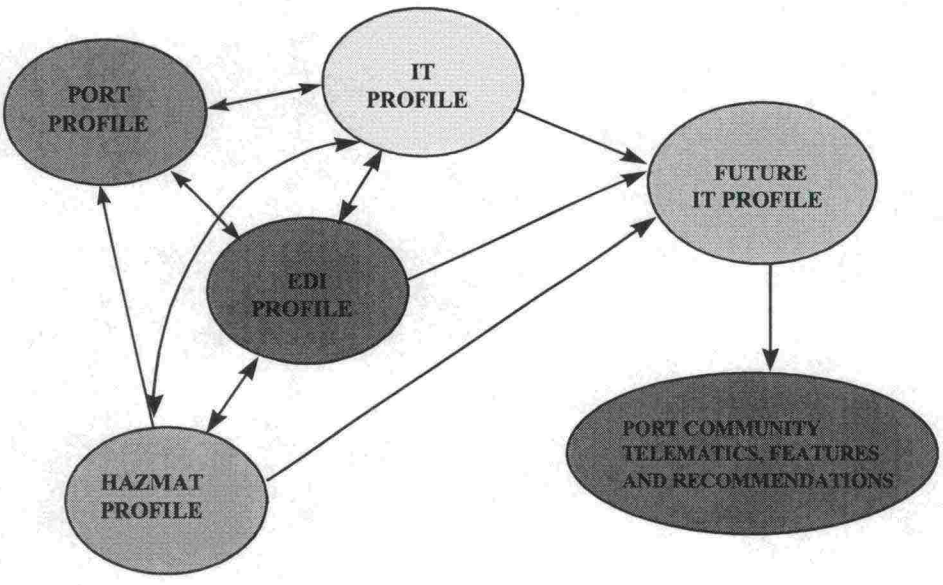
- Belgium
- Denmark
- Finland
- France
- Germany
- Greece
- Hungary
- Italy
- Ireland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- United Kingdom
- Bulgaria (non-COST)

In addition:
The Netherlands, Sweden, Algeria

Port Community Partners

- Port Authorities
- Port operators/Stevedoring companies
- Shipping agents and companies
- Forwarding companies
- Trucking companies
- Railway companies
- Customs Authorities
- River and channel authorities for the Inland Waterways

COST 330 Structure of the Analysis



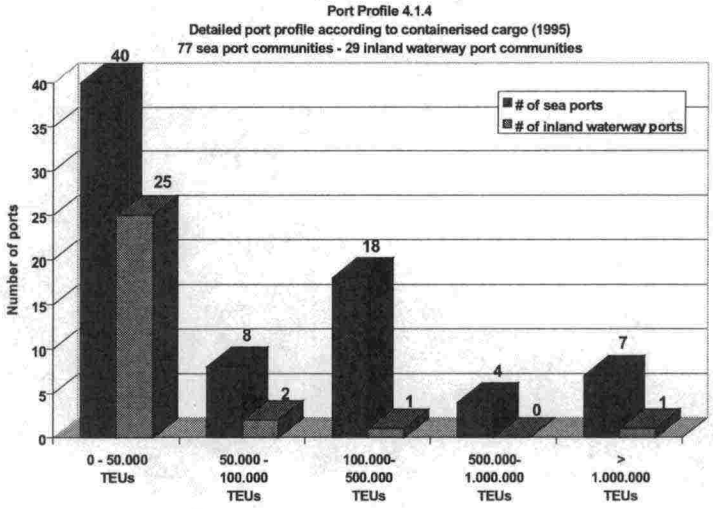
Port Profile - Geographic Distribution

	BALTIC SEA (23 PORTS)		
DENMARK	2 ports	GERMANY	6 ports
FINLAND	9 ports	SWEDEN	6 ports
	NORTH SEA AND ATLANTIC OCEAN (33 PORTS)		
BELGIUM	2 ports	PORTUGAL	4 ports
FRANCE	4 ports	SPAIN	3 ports
GERMANY	6 ports	The NETHERLANDS	1 port
IRELAND	4 ports	UNITED KINGDOM	9 ports
	MEDITERRANEAN SEA AND BLACK SEA (21 PORTS)		
ALGERIA	1 port	ROMANIA	1 port
FRANCE	2 ports	SLOVENIA	1 port
GREECE	4 ports	SPAIN	4 ports
ITALY	8 ports		
	INLAND WATERWAYS (29 PORTS)		
BELGIUM	4 ports	HUNGARY	4 ports
BULGARIA	1 port	ROMANIA	3 ports
FINLAND	4 ports	SLOVAKIA	2 ports
FRANCE	2 ports	SWEDEN	1 port
GERMANY	8 ports		

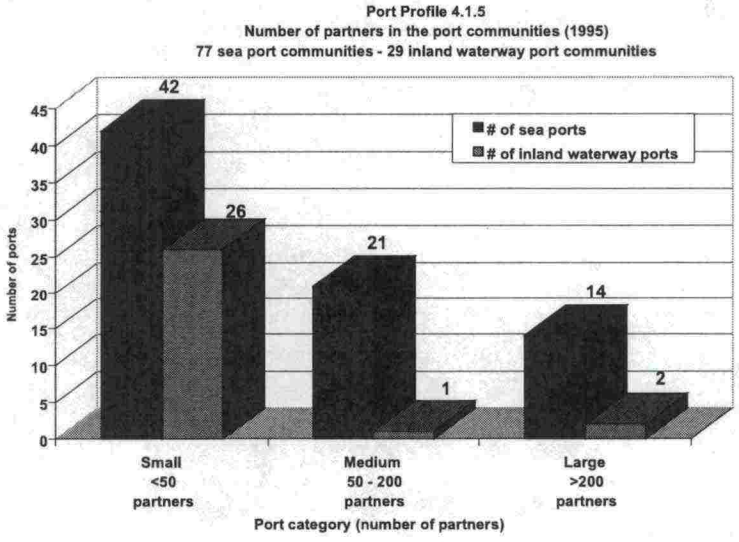
Port Profile - Annual Cargo Volume

Mtons	Sea Ports	Inland Ports
0-2	19	18
2-4	9	2
4-8	10	2
8-12	7	1
12-16	7	2
16-20	6	2
20-24	7	0
24-50	7	1
>50	6	1
Total	77	29

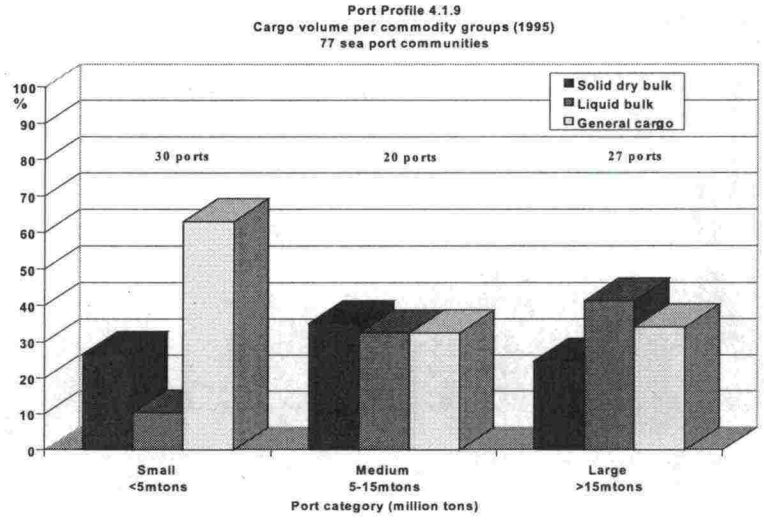
Port Profile
Annual Containerised Cargo Volume



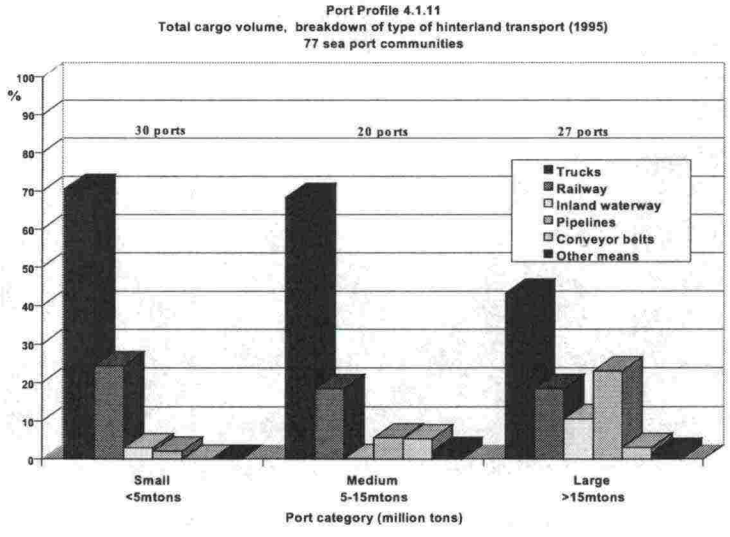
Port Profile
Number of Port Community Partners



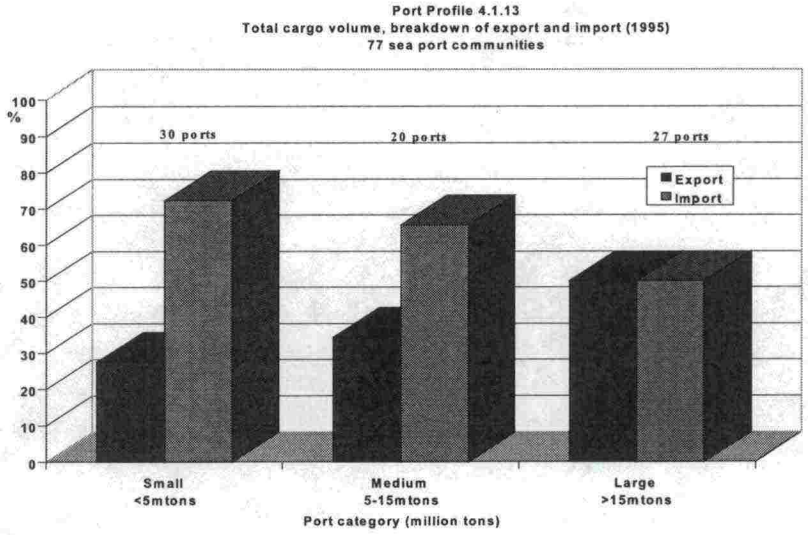
Port Profile
Cargo Volume per Commodity Group
Sea Ports



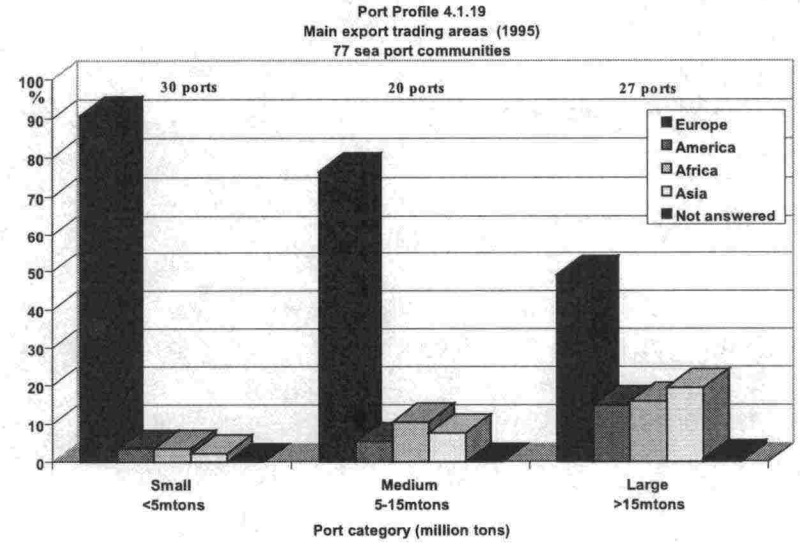
Port Profile
Breakdown of Hinterland Transport, Sea Ports



Port Profile
Breakdown of Export and Import
Sea Ports

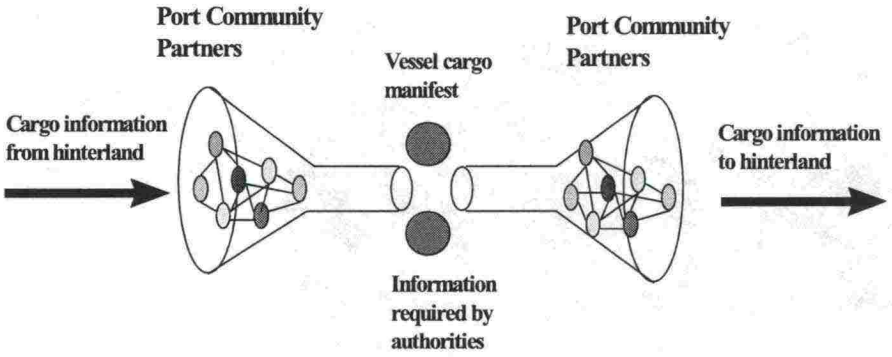


Port Profile
Main traiding areas, Sea Ports



Port Community Telematics

Port Community Telematics
Role in cargo logistics



Special features of the study

- Port community partners
- Port community telematics
- Not only an EDI study
  - Software application level
  - Interconnectivity and telecommunications
  - Problems
  - Future trends
- 25 EU projects, studies in the same field

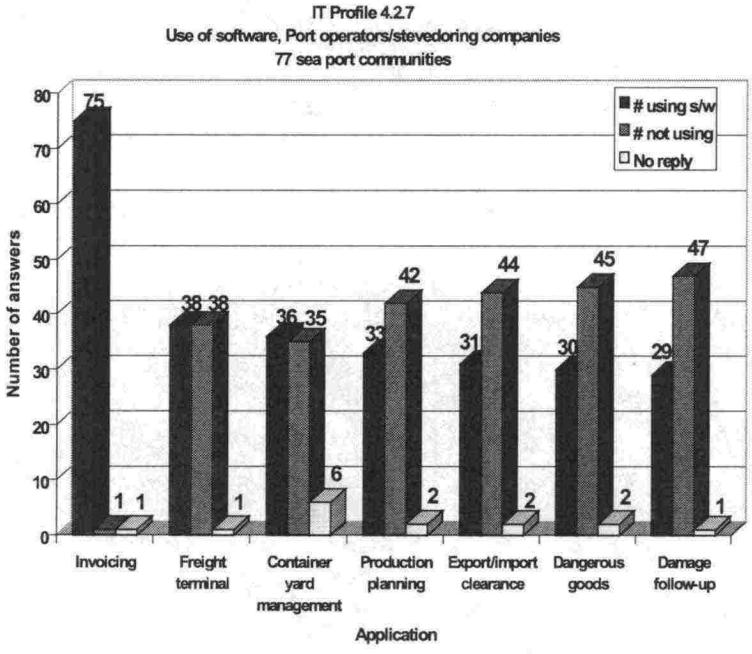
Features

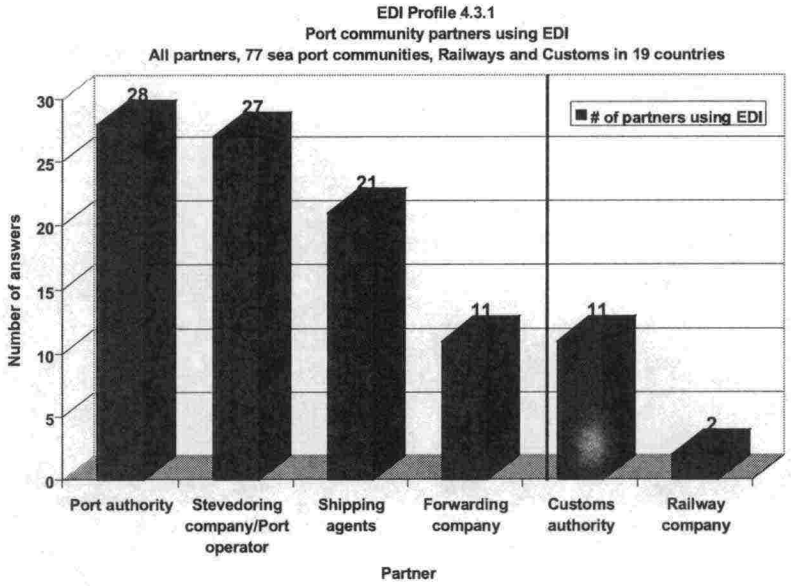
Use of software applications
- Average use low
- Common in less than half of the ports
  - port authorities
  - port operators/stevedoring companies
  - forwarding companies
  - trucking companies
- Railways and customs – higher use of basic applications
- Some successful without any IT of with minor IT
- Big partners – all available IT solutions
- Inland waterway ports – lower use

Features

- IT platforms
  - Middle size hw and client/servers common
  - Main frames in centralised organisations
  - Stand alone PCs in trucking companies
- Software supplier, maintenance and support, outsourcing
  - Purchased from external suppliers when needed
  - Maintenance & support by external companies
  - Outsourcing not very high
- IT staff relatively small
- Problems in IT
  - Small and medium size partners
    - telecommunication infrastructure not sufficient
    - telecommunications expensive
  - Trucking and forwarding companies
    - no vital knowledge to implement modern IT
  - All partners
    - old software, old hardware – main problems
  - Inland waterway ports
    - lack of telecommunications infrastructure
- Level of EDI
  - 26 % of the 106 port communities
  - Hardly within inland waterway ports
  - Most frequently by port authorities and port operators/stevedoring companies
  - Trucking companies – no use
  - Half of the customs authorities
  - Two railways
- Trucking companies no EDI contacts with the ports (in our sample)
- Forwarding companies mainly with the customs
- Driving forces: port authorities and customs authorities
- Use of EDI
  - More non-Edifact than Edifact messages
  - Adaptation of standard Edifact messages in the future
  - Local Edifact messages – barrier
  - Stevedoring companies cargo information from the industry
  - Most frequently used Edifact messages: CUSREP, BAPLIE, IFTDGN, CUSDEC, IFCSUM
  - Same messages in the future
- Main EDI applications
  - cargo mainfest and declaration
  - cargo booking
  - stowage plans
  - dangerous goods information
- Two ports no EDI development, moving to Internet/Intranet

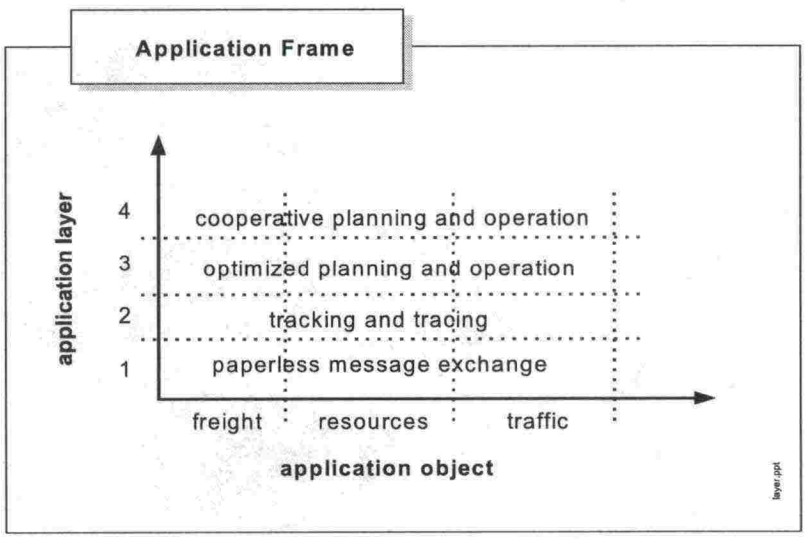
- Port Community Systems (PCS)
  - providing EDI for partners
  - partners in sea ports equally in favour or against
  - not interesting for inland waterway ports
  - port authorities willing to be shareholders
- Use of EDI not increasing in short term
- Interest in alternative IT development – higher added value
- Preferences
  - new software
  - new operating systems and hardware
  - Internet
  - mobile and satellite
- EDI agreements between EDI partners
- IT value added services
  - need of higher level of IT
  - low use of IT – changes in the role
- Use of Internet/Intranet
  - low use
  - high priority in future development
- Dangerous goods information management
  - mainly handled manually
- Improvement of the port community telematics
  - dependent on individual companies and market forces
  - awareness of more powerful and user friendly IT

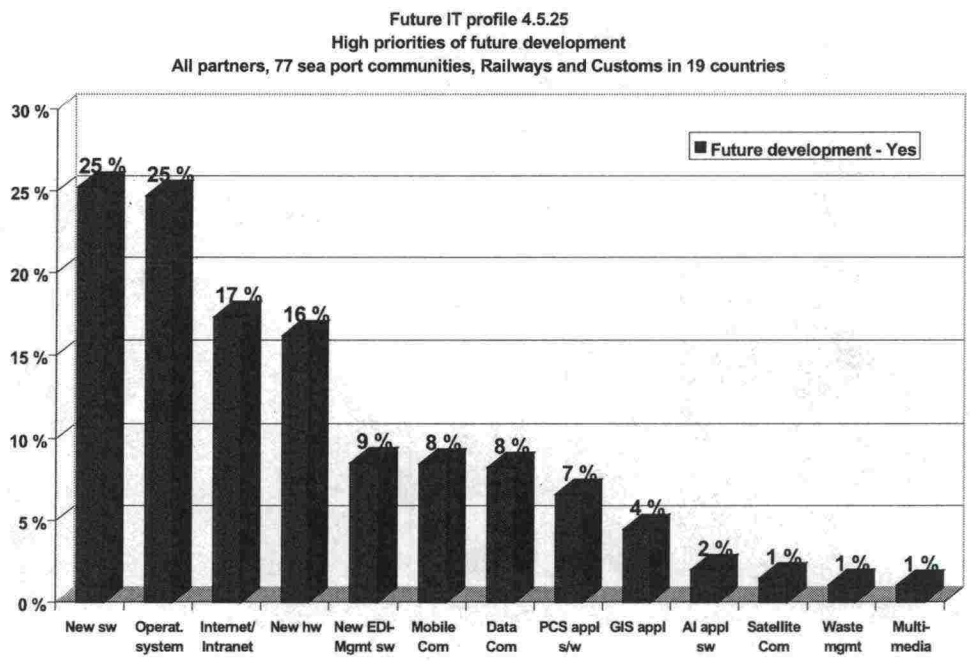




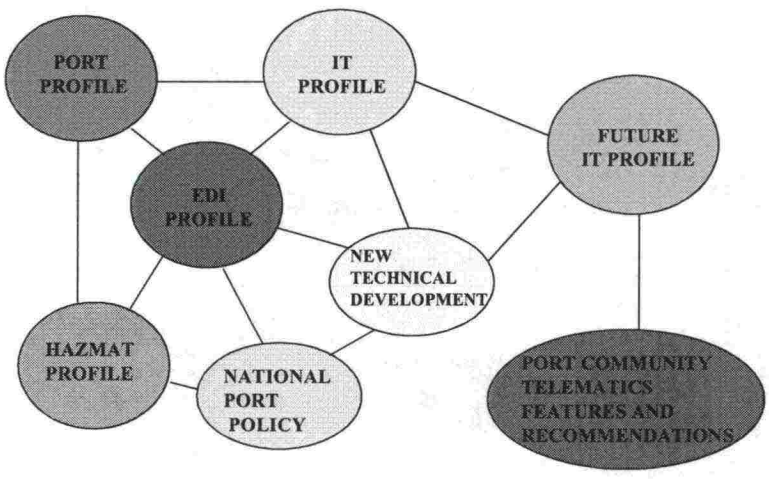
Trends

Implementation of NewTechnologies





Features and Recommendations - Conclusions

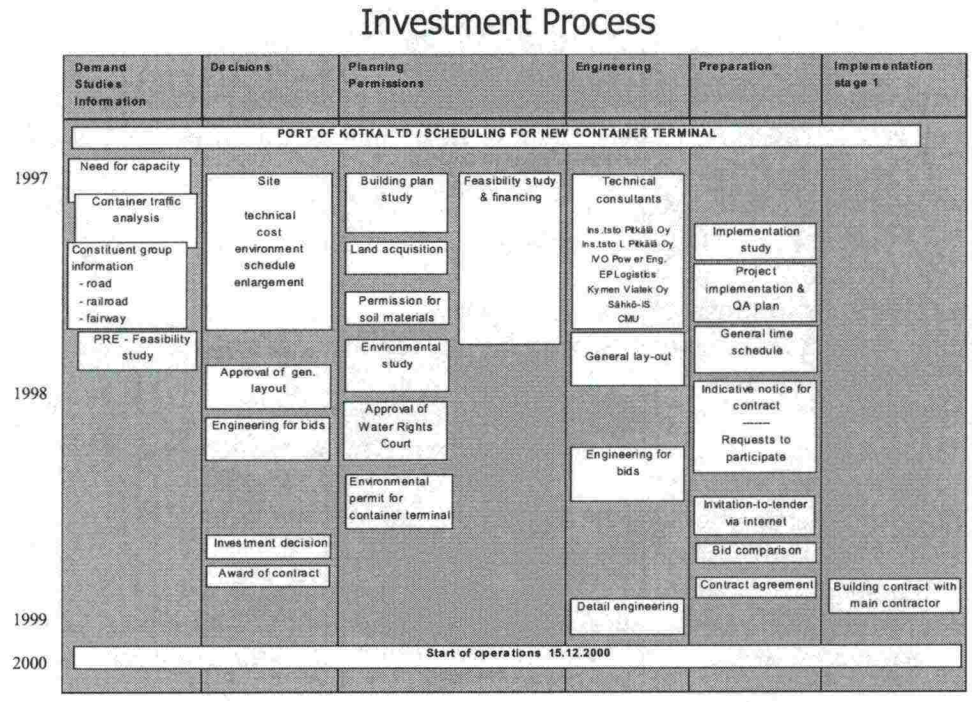


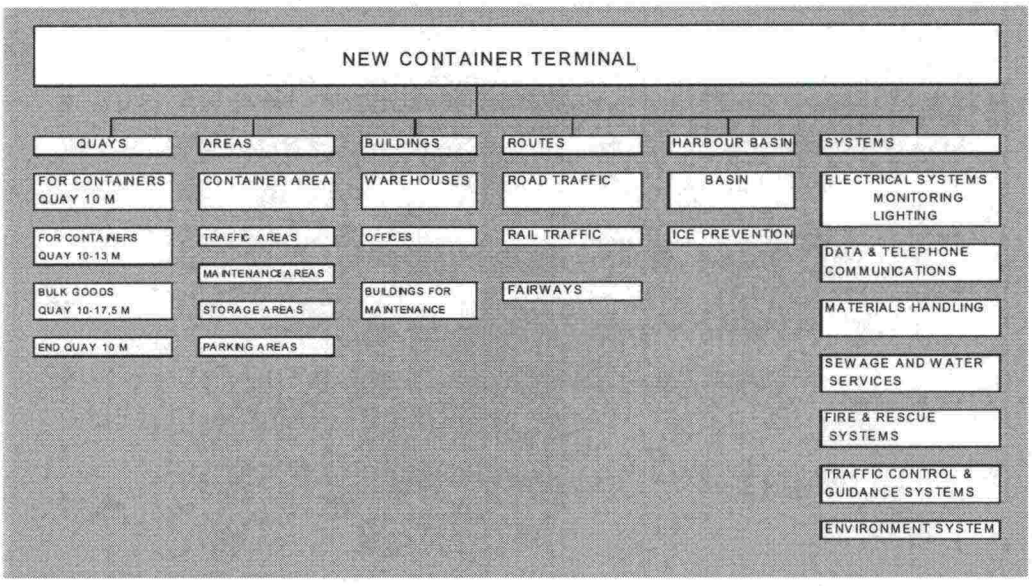
Recommendations

- Working routine and processes
  - harmonisation, simplification, standardisation
- Port community telematics
  - greater investments in IT
  - cost-benefit model of IT investments
  - quicker implementation of modern IT
  - port telematics – a critical quality factor
  - 'one stop shopping' in the supply chain management
- Software applications
  - new, easy to use, modular software applications for the SME Partners
  - software providers reasonable services and outsourcing
- Port community systems
  - 'right-sizing' for the SMEs
- New IT services on Internet technologies
  - new value added IT services
  - new joint applications for simultaneous use
  - European R&D activities to support new IT services
- Inland waterway ports
  - infrastructure development in Central and Eastern Europe
- Co-operation between sea and inland waterway ports in Western and Eastern Europe
- European R&D programmes
  - special R&D programme in Port community IT for SME partners
  - definition of the strategy for IT user technologies and know-how for Central and Eastern European countries which are newcomers to the EU, extended to the MEDA countries
- National R&D programmes
  - SME partners should be included
- Green logistics telematics, green telematics
  - assist to move cargoes from land to sea
- Driving forces of IT development
  - new study
- Technology transfer
  - success stories of IT implementations
- Quick and complete opening of telecommunications infrastructure
  - lower telecommunications costs

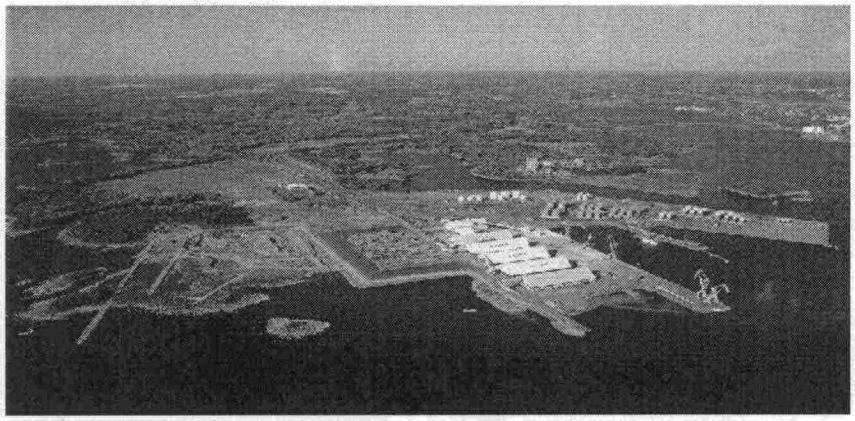
Ms. Riitta Kajatkari
Technical Director
Port of Kotka, Finland

PLANNING A NEW PORT – CASE MUSSALO IN KOTKA

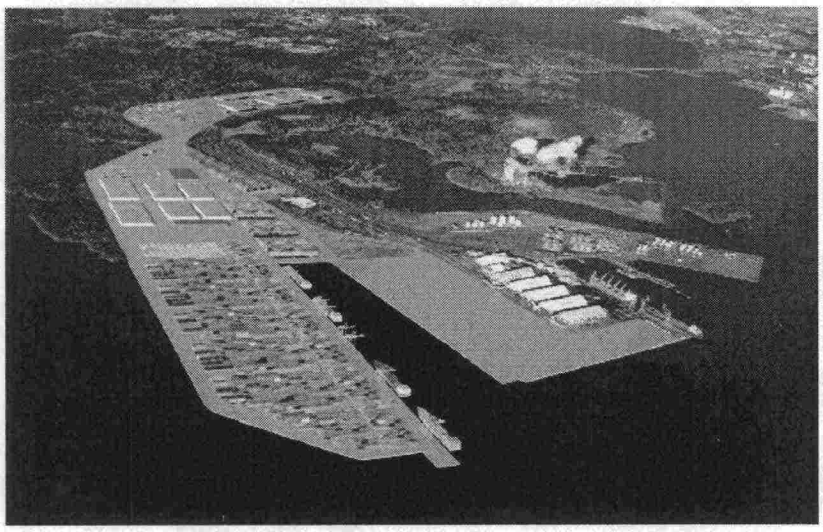




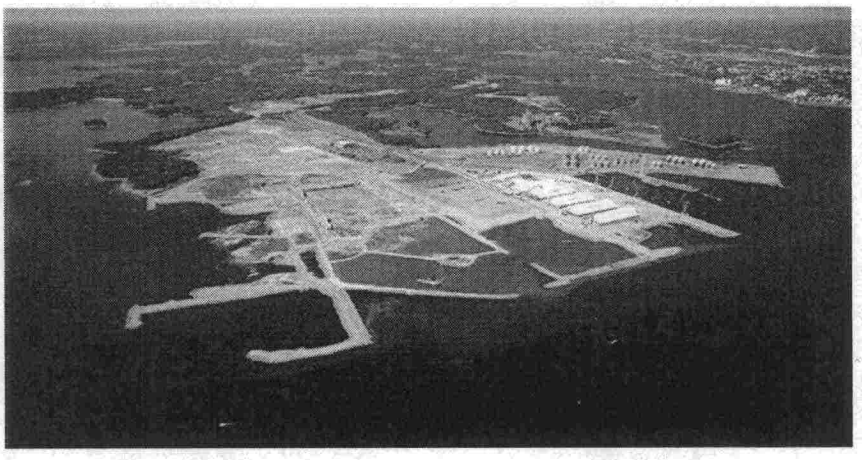
Mussalo Deepwater Terminal, Autumn 1998

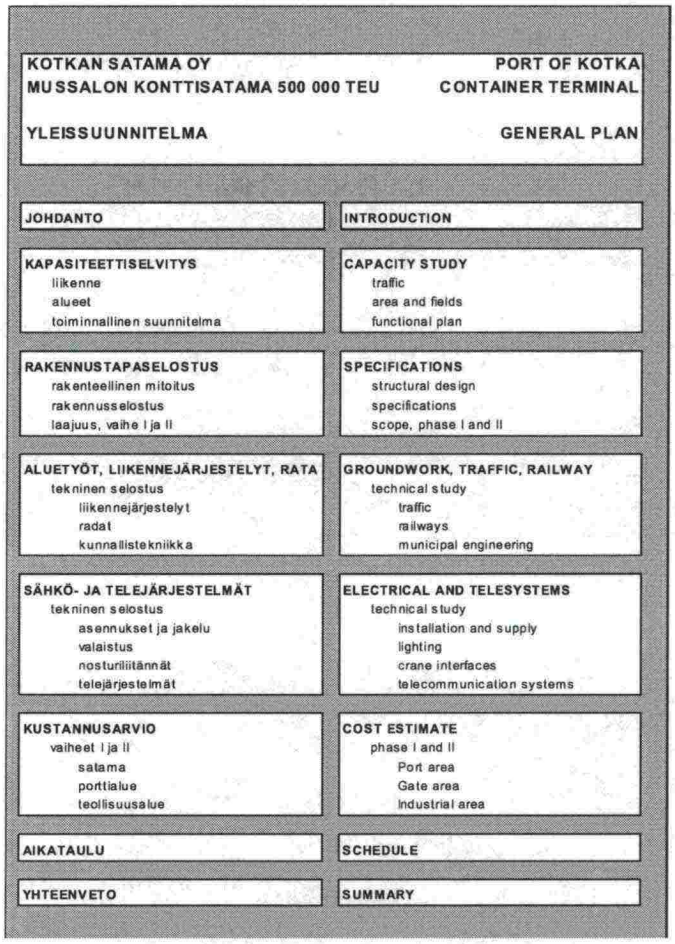


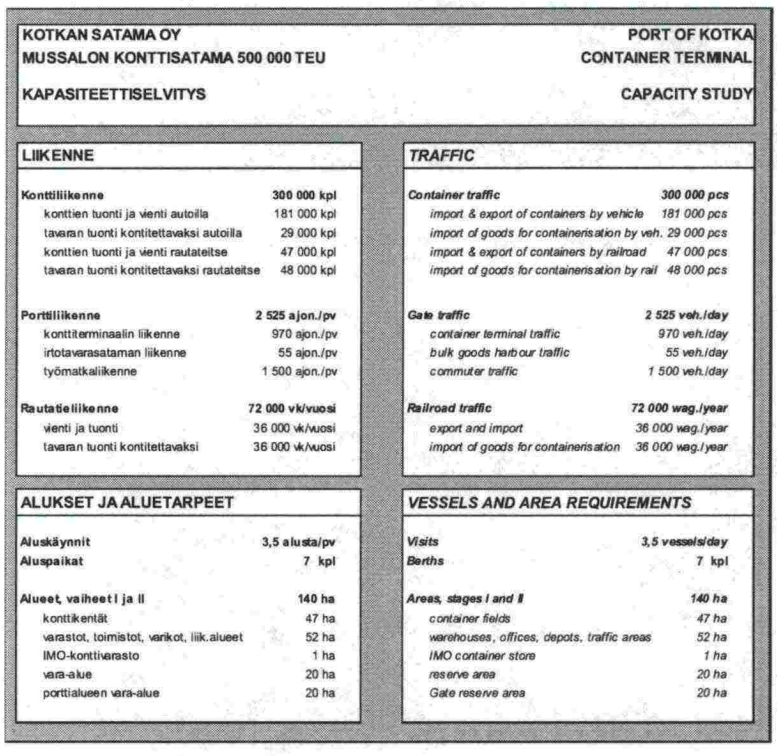
Mussalo Deepwater Terminal

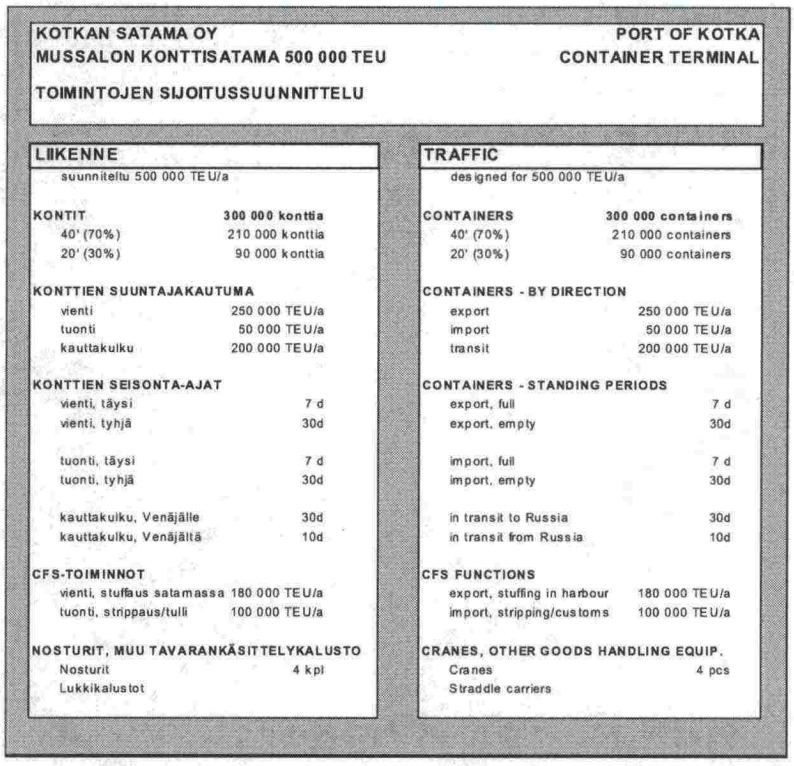


Mussalo Deepwater Terminal, Summer 1999




KOTKAN SATAMA OY
MUSSALON KONTTISATAMA 500 000 TEU
YLEISSUUNNITELMA
PORT OF KOTKA
CONTAINER TERMINAL
GENERAL PLAN
JOHDANTO
INTRODUCTION
KAPASITEETTISELVITYS
liikenne
alueet
toiminnallinen suunnitelma
CAPACITY STUDY
traffic
area and fields
functional plan
RAKENNUSTAPASELOSTUS
rakenteellinen mitoitus
rakennusselostus
laajuus, vaihe I ja II
SPECIFICATIONS
structural design
specifications
scope, phase I and II
ALUETYÖT, LIIKENNEJÄRJESTELYT, RATA
tekninen selostus
liikennejärjestelyt
radat
kunnallistekniikka
GROUNDWORK, TRAFFIC, RAILWAY
technical study
traffic
railways
municipal engineering
SÄHKÖ- JA TELEJÄRJESTELMÄT
tekninen selostus
asennukset ja jakelu
valaistus
nosturiliitännät
telejärjestelmät
ELECTRICAL AND TELESYSTEMS
technical study
installation and supply
lighting
crane interfaces
telecommunication systems
KUSTANNUSARVIO
vaiheet I ja II
satama
porttialue
teollisuusalue
COST ESTIMATE
phase I and II
Port area
Gate area
Industrial area
AIKATAULU
SCHEDULE
YHTEENVETO
SUMMARY


KOTKAN SATAMA OY
MUSSALON KONTTISATAMA 500 000 TEU
KAPASITEETTISELVITYS
PORT OF KOTKA
CONTAINER TERMINAL
CAPACITY STUDY
LIIKENNE
Konttiliikenne 300 000 kpl
konttien tuonti ja vienti autoilla 181 000 kpl
tavaran tuonti kontitettavaksi autoilla 29 000 kpl
konttien tuonti ja vienti rautateitse 47 000 kpl
tavaran tuonti kontitettavaksi rautateitse 48 000 kpl
Porttiliikenne 2 525 ajon./pv
konttiterminaalin liikenne 970 ajon./pv
irtotavarasataman liikenne 55 ajon./pv
työmatkaliikenne 1 500 ajon./pv
Rautatieliikenne 72 000 vk/vuosi
vienti ja tuonti 36 000 vk/vuosi
tavaran tuonti kontitettavaksi 36 000 vk/vuosi
TRAFFIC
Container traffic 300 000 pcs
import & export of containers by vehicle 181 000 pcs
import of goods for containerisation by veh. 29 000 pcs
import & export of containers by railroad 47 000 pcs
import of goods for containerisation by rail 48 000 pcs
Gate traffic 2 525 veh./day
container terminal traffic 970 veh./day
bulk goods harbour traffic 55 veh./day
commuter traffic 1 500 veh./day
Railroad traffic 72 000 wag./year
export and import 36 000 wag./year
import of goods for containerisation 36 000 wag./year
ALUKSET JA ALUETARPEET
Aluskäynnit 3,5 alusta/pv
Aluspaikat 7 kpl
Alueet, vaiheet I ja II 140 ha
konttikentät 47 ha
varastot, toimistot, varikot, liik.alueet 52 ha
IMO-konttivarasto 1 ha
vara-alue 20 ha
porttialueen vara-alue 20 ha
VESSELS AND AREA REQUIREMENTS
Visits 3,5 vessels/day
Berths 7 kpl
Areas, stages I and II 140 ha
container fields 47 ha
warehouses, offices, depots, traffic areas 52 ha
IMO container store 1 ha
reserve area 20 ha
Gate reserve area 20 ha



KOTKAN SATAMA OY
MUSSALON KONTTISATAMA 500 000 TEU

PORT OF KOTKA
CONTAINER TERMINAL

TOIMINTOJEN SIJOITUSSUUNNITTELU

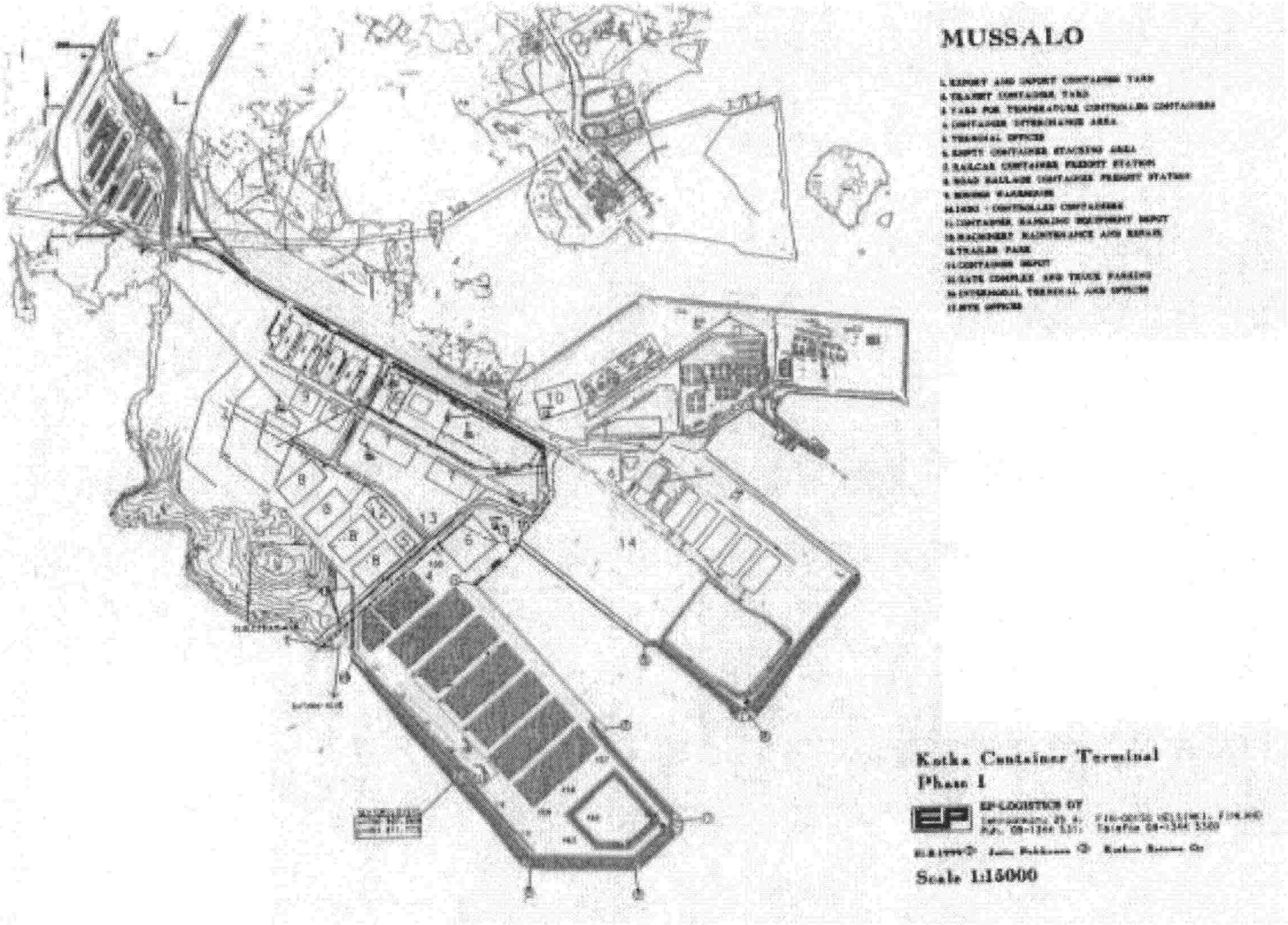
LIIKENNE	
suunniteltu 500 000 TEU/a	
KONTIT	300 000 konttia
40' (70%)	210 000 konttia
20' (30%)	90 000 konttia
KONTTIEN SUUNTAJAKAUTUMA	
vienti	250 000 TEU/a
tuonti	50 000 TEU/a
kauttakulku	200 000 TEU/a
KONTTIEN SEISONTA-AJAT	
vienti, täysi	7 d
vienti, tyhjä	30d
tuonti, täysi	7 d
tuonti, tyhjä	30d
kauttakulku, Venäjälle	30d
kauttakulku, Venäjältä	10d
CFS-TOIMINNOT	
vienti, stuffaus satamassa	180 000 TEU/a
tuonti, strippaus/tulli	100 000 TEU/a
NOSTURIT, MUU TAVARANKÄSITTELYKALUSTO	
Nosturit	4 kpl
Lukkikalustot	

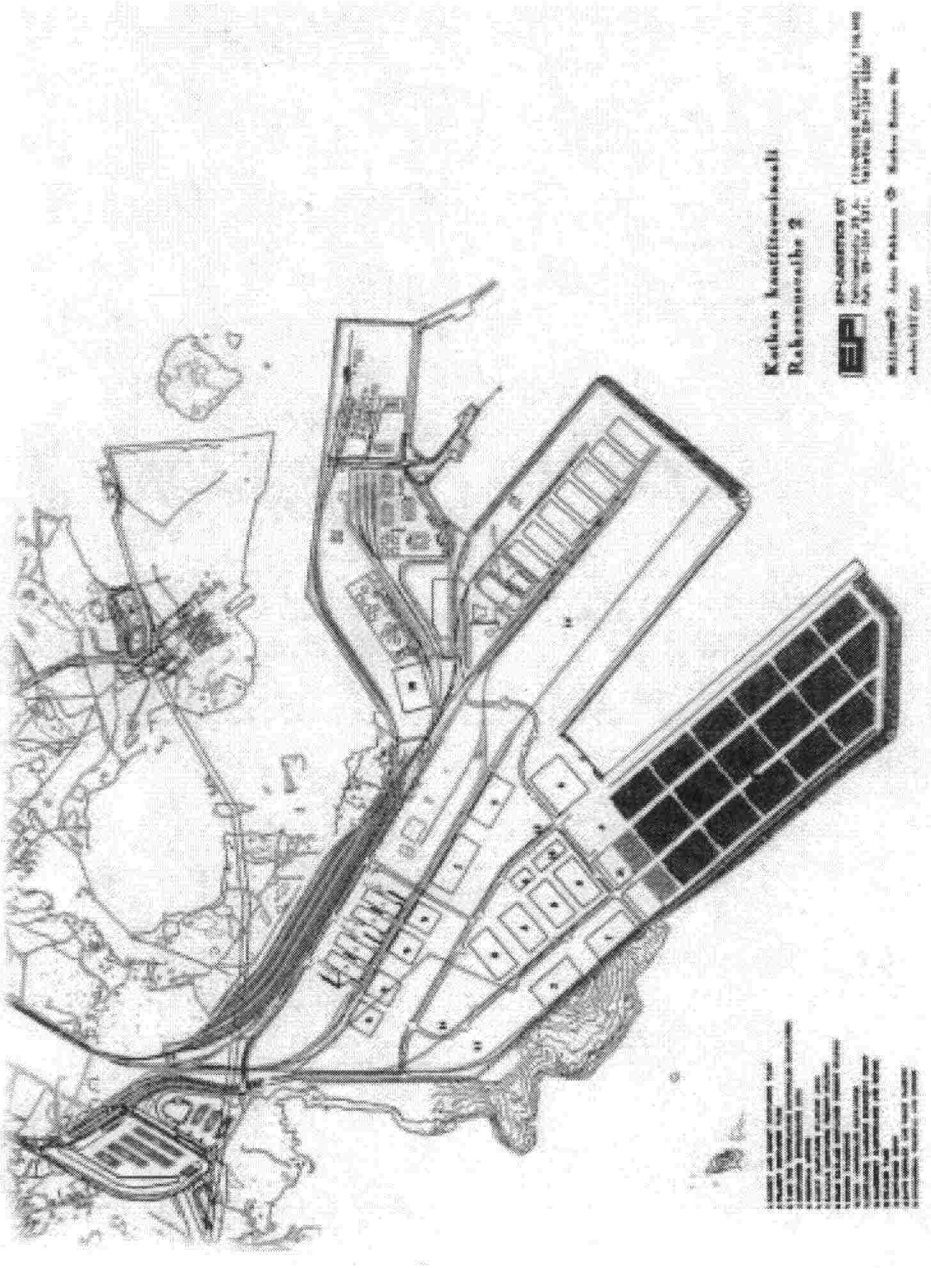
TRAFFIC	
designed for 500 000 TEU/a	
CONTAINERS	300 000 containers
40' (70%)	210 000 containers
20' (30%)	90 000 containers
CONTAINERS - BY DIRECTION	
export	250 000 TEU/a
import	50 000 TEU/a
transit	200 000 TEU/a
CONTAINERS - STANDING PERIODS	
export, full	7 d
export, empty	30d
import, full	7 d
import, empty	30d
in transit to Russia	30d
in transit from Russia	10d
CFS FUNCTIONS	
export, stuffing in harbour	180 000 TEU/a
import, stripping/customs	100 000 TEU/a
CRANES, OTHER GOODS HANDLING EQUIP.	
Cranes	4 pcs
Straddle carriers	

Kotka Deepwater Container Terminal
Functional Plan

1. Export and Import Container Yard
2. Transit Container Yard
3. Yard for Temperature Controlled Containers
4. Container Interchange Area
5. Terminal Offices
6. Empty Container Stacking Area
7. Railcar Container Freight Station
8. Road Haulage Container Freight Station
9. Bonded Warehouse
10. IMDG-controlled Containers
11. Container Handling Equipment Depot
12. Machinery Maintenance and Repair
13. Trailer Park
14. Container Depot
15. Gate Complex and Truck Parking
16. TEN Intermodal Terminal and Offices

- Terminal area with supporting activities totals 100 hectares
- Quay lenght 1000 metres
- Main container handling method is based on Straddle Carriers
- Capacity 500 000 TEU / year


MUSSALO
Kotka Container Terminal
Phase I
EP-LOGISTICS OY
Scale 1:15000


Kuhan kauttiavuoksi
Rakennusaika 2

KOTKAN SATAMA OY — PORT OF KOTKA
MUSSALON KONTTISATAMA 500 000 TEU — CONTAINER TERMINAL

Rakennustapaselostus — Specifications

RAKENTEELLINEN MITOITUS

- Kartat
- Meteorologiset tilastot
- Hydrologiset tilastot
- Rakenteiden ympäristökuormat
  - tuuli
  - lumi
  - vedenpaine
  - virtaukset
  - aallokko
  - jää
  - maanpaine
- Alukset ja aluskuormat
- Laituritason kuormat
  - tavarakuormat
  - ajoneuvot
  - junat
  - nosturit
  - trukit, lukitym
- Korroosio ja muut kuormitustekijät

BASE OF DESIGN

- Maps
- Meteorological statistics
- Hydrological statistics
- Environmental loads on structures
  - wind
  - snow
  - water pressure
  - currents
  - waves
  - ice
  - earth pressure
- Vessels and loads
- Loads on quays
  - goods
  - vehicles
  - trains
  - cranes
  - fork lifts, straddle carriers etc.
- Corrosion and stress etc.

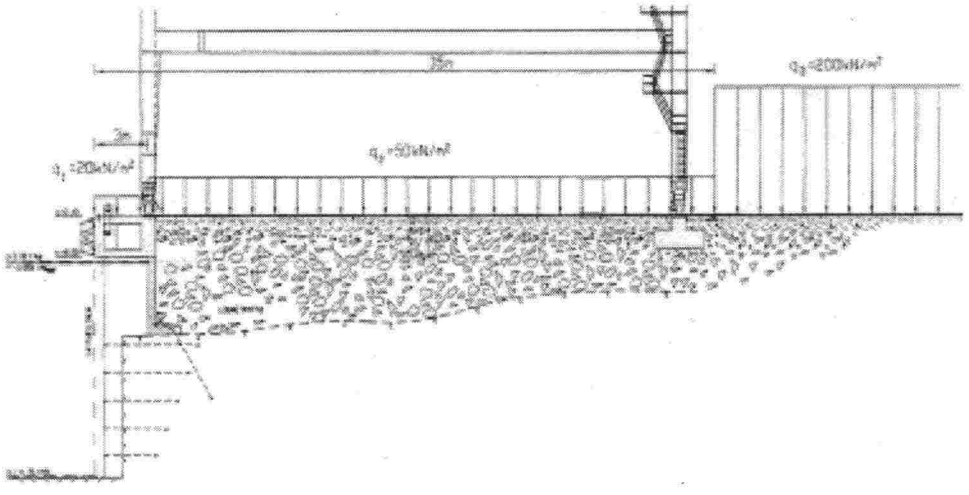
RAKENNUSSELOSTUS

- Rakennuspaikka ja pohjaolosuhteet
- Rakennusvaiheet
- Päämitat ja massamäärät
- Maa- ja vesirakennustyöt
- Laiturirakenteet
- Työvaiheistus

SPECIFICATIONS

- Site and ground conditions
- Stages of construction
- Dimensions and volumes
- Land & water construction works
- Quays
- Operational stages

Container Quay; Quay Level Loads



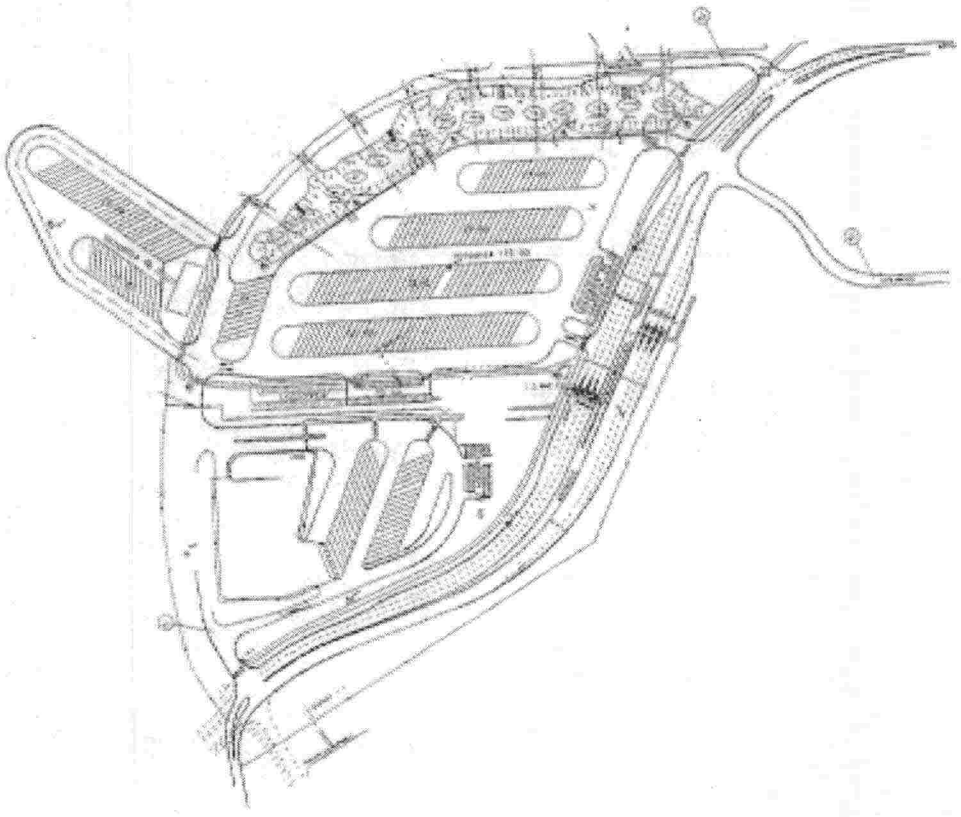
KOTKAN SATAMA OY
MUSSALON KONTTISATAMA 500 000 TEU

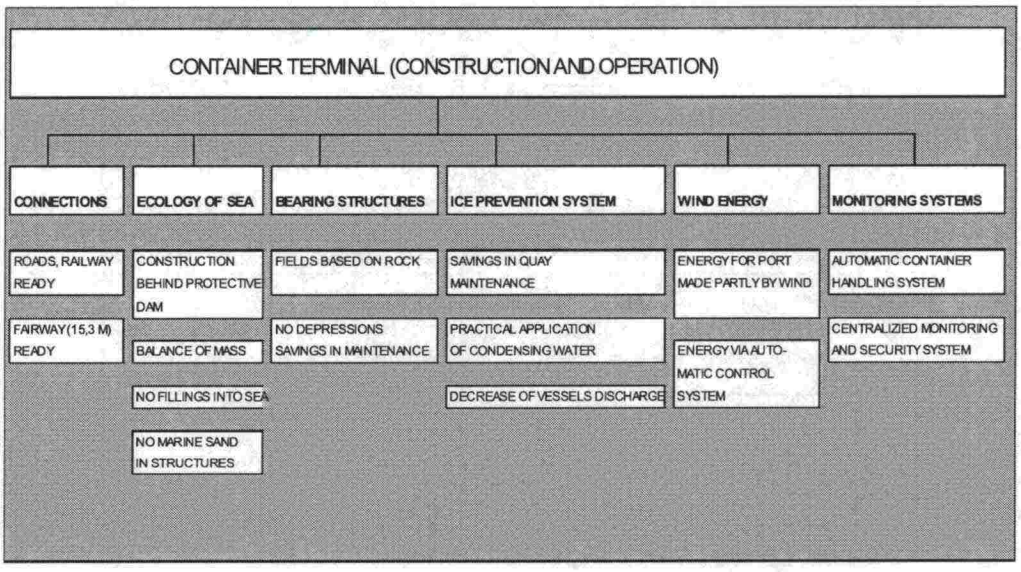
PORT OF KOTKA
CONTAINER TERMINAL

LIIKENNE- JA ALUESUUNNITTELU

TRAFFIC & AREA PLANNING

LIIKENNEJÄRJESTELYT Satama-alue Porttialue Teollisuusalue	TRAFFIC MANAGEMENT Port area Gate area Industrial area
ALUEEN TASAUS Satama-alue Porttialue Teollisuusalue	Leveling of fields, roads etc. Port area Gate area Industrial area
KUNNALLISTEKNIIKKA Satama-alue Porttialue Teollisuusalue	Muncipal engineering Port area Gate area Industrial area





KOTKAN SATAMA OY — **PORT OF KOTKA**
MUSSALON KONTTISATAMA 500 000 TEU — **CONTAINER TERMINAL**

INVESTOINTIOHJELMA, vaihe I — **INVESTMENT PROGRAM, PHASE I**

KUSTANNUKSET (235 million FIM)
vuosi 1999, 107 million FIM
vuosi 2000, 93 million FIM
vuosi 2000, 35 million FIM

COST (FIM 235 million)
year 1999, FIM 107 million
year 2000, FIM 93 million
year 2000, FIM 35 million

LAAJUUS

konttilaituri	600 m
bulklaituri	500 m
päätylaituri	180 m
terminaalialue	100 ha
rakennukset	4000 m2
allassyvyys	11,7 m

SCOPE

container quay	600 m
bulk quay	500 m
bottom (end) quay	180 m
terminal area	100 ha
buildings	4000 m2
basin depth	11,7 m

TOTEUTUSMÄÄRIÄ

maankaivu	700 000 m3
louhinta	2 500 000 m3
betoni	16 000 m3
betoniteräs	1 230 000 kg
kallioankkurit	50 000 m
täytöt	3 500 000 m3
putkistot	15 000 m
sähköputket	100 000 m

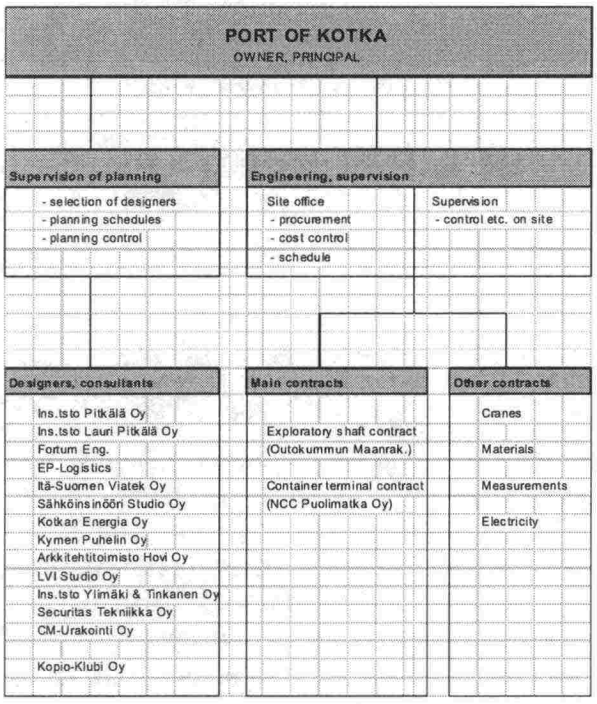
SUMMARY OF QUANTITIES

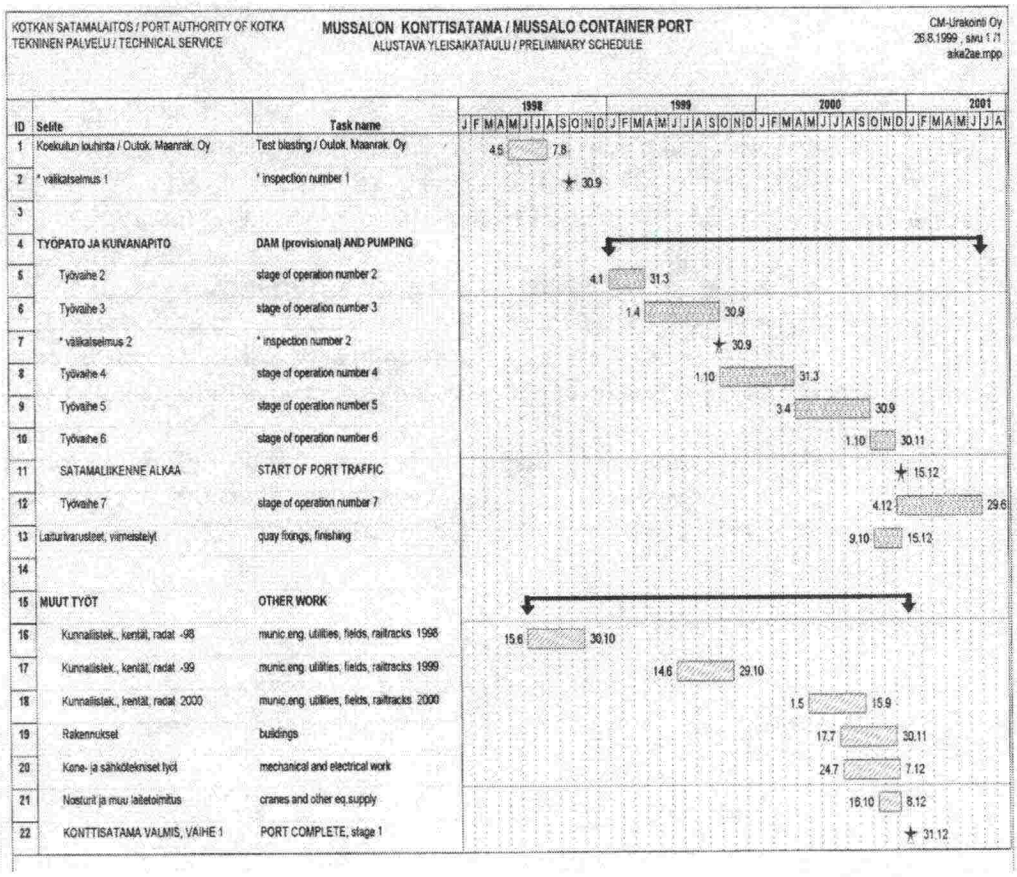
excavation	700 000 m3
quarrying	2 500 000 m3
concrete	16 000 m3
reinforcement	1 230 000 kg
rock anchorage	50 000 m
filling	3 500 000 m3
pipelines	15 000 m
elec.conduits	100 000 m

YHTEYDET
väylä valmis
rautatieyhteys valmis
tieyhteys valmis

CONNECTIONS (ready)
fairway
railroad
mainroad

Implementation Procedure





Mr. Jaan Vainu
Safety Officer
PakTerminal Ltd, Estonia

CONTROL OF ENVIRONMENTAL SAFETY AT PAKTERMINAL LTD

1. Introduction

Pakterminal, a joint-venture of N-Terminaal and Paktank International, operates an oil terminal since March 1993 in port of Muuga, Tallinn, Republic of Estonia. The activity of Pakterminal consists of rendering transshipment and storage services to the oil industry for which purpose a storage capacity of 197 500 cbm is available. At this moment the main part of the operation consists of storing/handling of oil products coming from Russian refineries.

The existing installation is situated on the far end of the western breakwater of the port of Muuga. The terminal consists of three double-track railtankcar unloading areas. 27 storage tanks, totalling up to 197 500 cbm storage capacity, three berths able to accommodate sea-going ships up to 25 000 dwt, a boilerhouse, three main and one additional pumpplace, a fire-water pumphouse and a foamhouse. The infrastructure is formed by a number of product/-jetty pumplines, part of which are piggable and most are insulated/electrically traced for products to be heated.

The overall design and engineering supervision is carried out by the Dutch based engineering department of Paktank Nederland B.V. The electrical supply and automation systems are engineered and designed by Finnish based engineering company Paasio Engineering. The lay-out, constructions and technology of the pipelines are designed by the Dutch based engineering company Vicoma.

Fire protection system is designed by the Estonian fire-fighting authorities. Topographical and geological investigations are carried out by the Estonian firm 'REI'. The civil design will be made by a local company. All other construction work and applied technology is according to rules and regulations in force in Estonia.

Before the start of the operations of the terminal, a committee of the Estonian authorities reviewed the terminal whether it was constructed in accordance with the permits. The lay-out is made according to Dutch regulations CPR 9.3.

2. Technical measures

To prevent environmental accidents and to protect it in case of accidents with oil tanks and during loading and unloading operations, the following systems are installed:

2.1 Tank level measurement system and data information system.

Before starting the operations, all storage tanks are fully tested with water, cleaned after the water test and calibrated by an independent surveying company (*SGS*).

For measurement of the liquid product-fill of the storage tanks an Enraf tank inventory management system is installed on each storage tank. Based on the operational filling data of each storage tank, two operating overfill alarms are installed in the measurement system as a high and high high alarm.

The data of the individual Enraf 854 device of each tank is transmitted to a computerized so-called Entis system which has its readings in the central control room (CCR). The software of the Entis system is based on an IBM configuration, IBM-PS/2 (Entis = Enraf Tank Inventory System).

The data of the tank filling rates, calculated tank fill capacity and other operational product data can be displayed on a colour monitor and will be printed out on an Epson LX400 printer. On K-1 product tanks the additional overflow protection (Rotork-Magnitrol) system is installed. A power-failure system is coupled to the measurement system to guarantee that the product data of each tank will always be available.

2.2 Standards for pipeline venting, manometers and pumps stop systems on the product pipeline

The design of the product lines is based on PN16 DIN 2633. Based on the local winter temperature conditions all the product lines are electrically heated with Pyretenac heating cables (Swiss made) and are insulated. The design and lay-out of the heating-system are based on Finnish regulations.

During operations the product lines will usually be kept filled with product. Emptying the lines after each incoming or outgoing operation is not considered required to be usual for this type of transhipment operations. For operational use and control service hand operated venting systems, product sampling devices and pressure control by manometers are installed based on Paktank standards.

Surge pressure systems are installed at the pumpplaces to prevent overpressure and breaking of the joints of the pipeline systems. For operational use and to stop the pumps in emergency situation, all loading and unloading pumps can be stopped from

CCR. Also, all the jetties are equipped with the emergency stop bottoms, to stop all the loading pumps in emergency situation.

2.3 Tank data and bottom sealing

The tanks are built according to Russian standards. For each tank an individual tank passport will be supplied with all the relevant information of the chemical and physical data of the steel, the shop welding tests results, the detailed drawings, etc.

The tanks are manufactured by the Saratovsky Metal Works that works with the certificate of 'Lloyd Register'. These reservoirs also meet the USA standard requirement API 650 and the British standard 2654. The steel tank bottom laying on the tank foundation will be protected for water entry from the outside with an asphalt cover that prevents the water entry at the foundation side of the tank bottom.

2.4 Water draw off system

Based on high throughput volumes, the residence time of the products in the tanks will be very short, so settling of water underneath the product will not occur and the product will stay homogeneous.

In case water still would separate underneath the product, this water can be drained off from the drainpit (sump) in the tank bottom by a small water draw-off-line, that is coupled to the tank line. In case no normal operation takes place on the terminal and water has to be drained, then, as standard practice, the water draw off has to take place by using a vacuum truck. The collected draw off water will be disposed of at oil separation and waste water treatment system.

2.5 Protection against soil pollution in tankpits

The tank foundation consists of concrete piles bearing a concrete slab on top of which the tank is placed. The slab is designed in such a way that possible spill as a result of leakage is gathered and led to a drain pipe for inspection/detection.

The bottom of the tankpit is covered with plastic sheeting between two sand layers with on top a gravel layer, in order to prevent oil penetration in the soil of the tankpit in case of an oilspill accident. The plastic sheeting has a slope towards a drainage system that collects and transports rainwater to the oil separation system (see part 3). The drainage pipelines leaving the tankpits are supplied with valves that are normally in closed position.

2.6 Air quality protection measures

To reduce the HC-emission to the atmosphere the following facilities have been installed:

- in case of storing class K-2 products, the tanks are equipped with pressure/vacuum (P/V) relief valves and emergency vents;
- in case of storing class K-1 products, the tanks are equipped with internal floating roof, P/V relief valves and emergency vents.
- Also the N2 unit and distribution system are available if required by the client;
- The automatic air monitoring (gas-cromatograph) station operates near the terminal and data of air quality and pollution rates (including the rate of aromatic hydrocarbons) are available permanently.

3. Process description of oil separation and waste water treatment system

3.1 Introduction

Polluted water (see Annex 3) from tankpits, jetties and railcar unloading areas will be collected in a sewer system that leads to the newly built waste water treatment through oil separators.

3.2 Pollution sources

3.2.1 Tankpits

In tankpits, 27 storage tanks in 3 phases, with the total capacity of 197,500 cbm, are located. These tanks are designed for storing class K-1 and K-3 products.
Products to be stored are:

- heavy fuel oil
- fuel oil
- gasoil
- gasoline
- kerosene
- naphtha
- crude oil

The above-mentioned tanks are located on piled reinforced concrete foundations, in a comparted tankpit; an area surrounded by reinforced concrete walls. The tankpit floor is closed by means of a PE-LD film, to prevent pollution to the soil during a possible product spill. Rainwater is collected and will be led to the sewer system. Between the tankpit-drain and the sewer system are installed valves that are normally closed. In this way rainwater from each compartment of tankpits can be drained to the sewer system in a controlled way. Water draw off from these tanks will be done by a vacuum truck.

3.2.2 Jetties

On the concrete operating platform have been installed electrically heat-traced drippans under all locations of possible spillage. The contents of these drippans are led to an electrically heat-traced steel buffertank that is located under jetty platform. Rain water from the platform will also flow to the above-mentioned tank.

In this buffertank is located a pump with a level switch, to pump waste water to the sewer system on shore. The pump can start and stop automatically, depending on the level inside the buffertank. As a normal procedure however, the level switch in the buffertank, will give a high level alarm to the central control room only, from where the shiftleader can give a remote start command to the pump. At a low level, the pump will stop automatically.

3.2.3 Railcar unloading areas

Our terminal has 3 railtankcar loading and unloading platforms, that are placed on a completely closed, sloped, concrete foundation, to prevent possible product spills to the soil. One of them is covered with a roof, only a minimum of rainwater is led to the sewer system.

Product rests from loading arms and cleaning of pipelines will be led to the central collection pipe. This pipe leads to the collection tank. From the unloading areas, the polluted water can be drained in a controlled way to the sewer system by means of valves that are normally closed. In this way product spills will not enter the sewer system but will be taken out by a vacuum truck for further treatment.

3.3 Waste water treatment

The waste water treatment system at Pakterminal will consist of the following parts:

3.3.1 Pumppit

In the pumppit rainwater from the terminal areas as described above is collected and will be pumped into a sandtrap.

3.3.2 Sandtrap

In the sandtrap solids will settle and water will flow on gravity to the oil separator.

3.3.3 Oil separator

An oil separator, type Superpek 2223, will be installed with an integrated tilted plate-separator. From the above-mentioned sandtrap water will flow into the Superpek. In the Superpek, oil will be separated from water, based on two principles:

- Relaxation. Due to a certain hold-up time in the separator, oil will start floating on water due to the difference in specific gravity.
- Tilted plate separation. Because of the waved shape and the angle of the plates in the tilted plate separation part of the oil separator and the fact that the surface is reduced, there will be an increase in speed of the transported water. Very small particles are 'melted' together in the highest part of the wave of the plates and there speed will increase relative to the water speed, accelerated by the angle of the plates and the lower specific gravity. Particles heavier than water will do the opposite and fall down and settle on the bottom of the oil separator.

The Superpek 2223 oil separator is equipped with a two-stage oil alarm, set for emptying the floating oil at the correct time in a controlled way. Distance monitoring of the oil contents will be done in the central control room (CCR).

3.3.4 Pumppit 2

Purified water will flow on gravity from the oil separator to pumppit 2, from which it will be pumped into the waste water tank.

3.3.5 Waste water tank

A 1 000 cbm net capacity waste water tank is installed to collect waste water from all parts of the terminal as described above. As all other tanks in the terminal, this tank is also installed on a piled, reinforced, concrete foundation, with reinforced concrete walls surrounded tankpit. The bottom of this tankpit is covered with PE-LD lining to prevent possible spills polluting the soil.

This insulated waste water tank is equipped with the following equipment:
- Fire-fighting equipment
- Pressure/vacuum valves
- Emergency vent
- Gauge hatches
- Temperature control system
- Temperature indication
- Level indication
- High and low level alarms
- Aircross
- Oil skimmer

1. Fire-fighting equipment, the tank is equipped with 2 foam-pourers and a top water pourer.
2. To reduce emissions to the air, the tank is equipped with two pressure/vacuum valves (PVVs) DN150; settings + 200 mm WG/ -50 mm WG.
3. To prevent damage to the tank in case of a malfunction of the PVVs, an emergency vent DN100 has been installed, with the setting of +250 mm WG.
4. For sampling, the tank is equipped with 5 pcs gauge hatches.
5. The waste water in the tank will be kept on the temperature above 0°C by means of steam injection.
6. Temperature indication will be distance monitored in the central control room (CCR).
7. Level indication will also be monitored in the CCR.
8. High and low level alarms will be monitored in the CCR.
9. An air-cross is installed in the tank to homogenise the tank contents by blowing with compressed air and to prevent the water being anaerobic. This air-cross will also be used for heating the water by steam injection.
10. The oil that has passed the oil separator, creates a floating film on top of the water and can be drained by a floating oil-skimmer. With this skimmer the oil-layer can be skimmed from the tank in a controlled way.

The oil that will be skimmed from the tank will go to the sandtrap before the oil separator for a second pass through the system or will be taken away by vacuum truck, depending on the oil layer thickness and the water contents in the recovered oil. The bottom sludge can be taken out of the tank by a vacuum truck, using the low suction line.

Depending on the water analysis taken from the waste water tank, water will be drained on gravity either to pumppit 1 before the oil separator for a second pass through the system or to pumppit 2 to be discharged to the sea. In a later stage, the discharge line from pumppit 2 can be connected to a further waste water treatment system or to the Port biological treatment, if necessary.

In the discharge line a flow-meter/ recorder is installed with remote flow-indication and registration in the CCR. This flow-meter will give commands to a flow-independent automatic sample system that will take samples of the treatment for registration, analysis and quality assurance. At the outlet of the system the water contains on average 5 mg oil/l. These samples will be stored for determination of effluent quality to authorities.

4. Prevention of leakage and accidents

Based on natural and technological accidents' and disasters' risk estimation (see Annex 2), wide scale of activities are carried out:

- Emergency Response Plan has been improved, detailed spill prevention and response methods have been worked out and introduced as well as the operational crew has been trained to act in emergency situations.
- All the vacuum-truck drivers have passed the ADR course and have received respective certifications.
- All the leakages and environmental accidents are registered and documented. Analyses are carried out to prevent such accidents in the future.
- Maintenance and inspection schedule for all terminal facilities have been worked out.

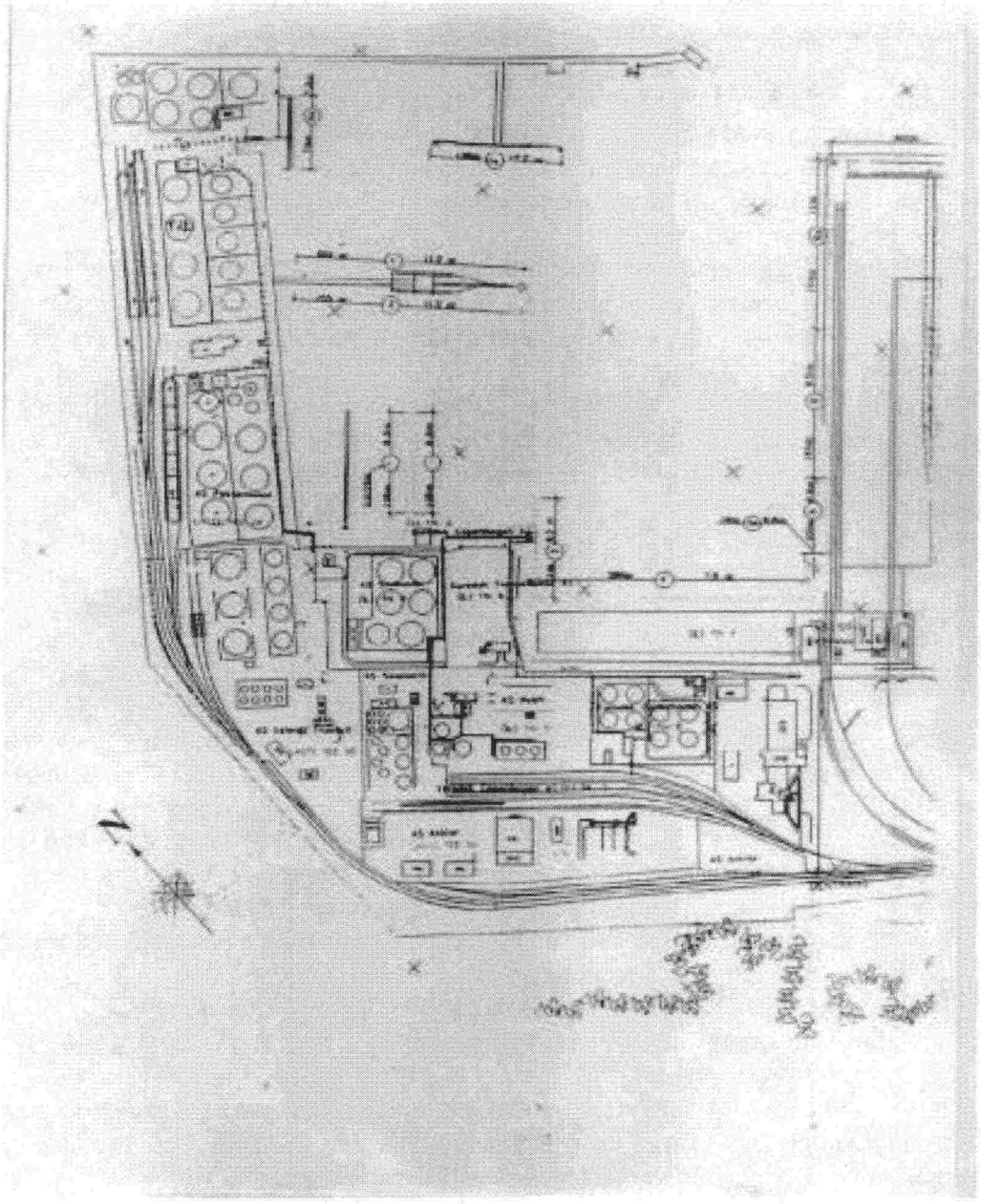
The maintenance aspects are based on the Dutch regulations CPR of the Ministry of Social Affairs, finalised by the Directorate-General of Labour and the Committee Disaster Prevention.

General maintenance and/or repairs are carried out by trained and authorised mechanics under the responsibility of the chief engineer or his deputy. A maintenance registry is at the site, in which all the repair and other maintenance activities are described and in which the work done is reported.

- For the purpose deep systematic risk analysis, the HAZOP methodology was used to study the environmental safety and fire risks in operating with K1 products.
- According to EEC Dir. 91/155, Safety Data Sheets are worked out for all products to be handled. The personnel carrying out jobs related with product handling have been trained and have thoroughly studied SDS.
- Work permits procedure and safe working instructions have been controlled and improved regarding environmental safety and fire risk.
- For training the co-operation of different fire-fighting and rescue boards, joint trainings have been carried out.

Using the wide scale of activities from risk estimation and HAZOP study, to start with, and trainings and drills of the personnel to finish with, we have reduced the risk of environmental accidents from tolerable to acceptable level.

Attachment 1.



Attachment 2.

Natural and technological accidents and disasters: Risk estimations.

No	Type of an accident	Description, objects of risk	Possible consequences
1	Damage of a tank	Trickling from the leak	Minor, local pollution
		Collapsing from the vacuum	Possible no pollution
		Explosion inside the tank	Damages, fire, major pollution, major bodily injuries
			in the worst cases also pollution of the sea
		Tearing of the welding	Major pollution, danger of fire
2	Fire	Inside a tank	see Explosion in a tank
		On board a vessel	see Explosion in a tank
		In a railtankcar	see Explosion in a tank
3	Landslip	Breakdown of a tank and pipelines	see Tearing of the welding
4	Accident with a vessel	With another vessel	Possible major pollution of the sea, danger of fire
		With an erection in the port	Material loss, possible pollution of the sea
5	Accident with a train	At a switch, down from the rails at an impasse	Material loss, possible pollution and danger of fire
		turning over	Material loss, possible pollution and danger of fire
		Hitching of railtankcars on the RUA	Material loss
		Collision with other train	Material loss, local pollution, bodily injuries
		Collision with a vehicle	Material loss, local pollution
		or accident with a person	bodily injuries, victims
6	Running down of pipe rack by a vehicle	The worst-breakdown of the pipeline	Possible major pollution, danger of fire
7	Explosion	Boiler in the boiler house	Breakdown of the boiler, stopping of the equipment
			bodily injuries, victims
		Pressure tank	Stopping of the equipment, bodily injuries
		Product vapours	In the worst case-explosion inside a tank
8	Breakage of the vessel hose	Maximum flow 0,4 m^3/sec	Major pollution of the sea water

9	Accidents with people	Falling from a height	Major bodily injuries, death
		Combustion	Bodily injuries
		Poisoning	Dangerous inside a tank, well, closed room
		Falling into the water	Possible drowning
		Being run over by a railtankcar	Major bodily injuries, death
		Car accident	Material loss, bodily injuries
10	Environmental pollution caused by wrong operations	Vessel overflow	Pollution of the sea
		Tank overflow	Pollution round the tank, fireguard
		Railtankcar overflow	Appr. twice per year, danger of fire
		Mixture of products	Major material loss
11	Minor environmental pollution	From the separation system into	
		the sea	Allowed
		the soil	Possible
		Emission of product vapours	Allowed
		Minor leakage from railtankcar	Major danger of fire in case of K-1 products
12	Failures from electricity	In winter the boilerhouse will become critical	The steam traps and condensate lines will freeze first

No	Primary activities	Preventive activities	Informing
1	Re-pumping of product	Maintenance and inspection schedule (MIS)	Management of the terminal
	Re-pumping of product	Written operating instructions (WOI)	Management of the terminal
	Localisation of the fire and pollution, first aid	Procedure-work permits, WOI	TTPA, Port dispatcher, Port fire-brigade
	Preventing flowing into the sea	Emergency response plan (ERP)	management of the terminal, see instructions for activity
	Preventing flowing into the sea, fireguard	Maintenance and inspection schedule	TTPA, Port dispatcher, management of the terminal
2	see Explosion in a tank	Area classification	inside a tank
	see Explosion in a tank	Written operating instructions	inside a tank

	see Explosion in a tank	Procedure-work permits	inside a tank
3	see Tearing of the welding	Emergency response plan	from the welding
4	Localisation of pollution, inform the saving crew	Emergency response plan	TTPA, Port dispatcher, management of the terminal
	Localisation of pollution, inform the saving crew	Emergency response plan	Port dispatcher, management of the terminal
5	Localisation of pollution, fireguard	Emergency response plan, WOI	Management of the terminal, in more serious cases-TTPA
	Localisation of pollution, fireguard	ERP, WOI	
	Repair works	Written operating instructions	Management of the terminal
	First aid, localisation of pollution	WOI	
	First aid, localisation of pollution, fireguard	Emergency response plan, WOI	Management of the terminal, emergency medical aid, police-if necessary
	Calling to police	Written safety instructions (WSI)	
6	Blocking of the damaged pipeline	Emergency response plan, safeguards, WSI	ERP
7	Blocking of the fuel flow, switching off of electricity	Emergency response plan	Management of the terminal, emergency medical aid-if necessary
	first aid, calling to police		
	Switching off of the electricity of the equipment		Management of the terminal, emergency medical aid-if necessary
	Connected with the pressure tank		
	See Explosion inside a tank	Emergency response plan, WOI	inside a tank
8	Localisation of pollution, inform the saving crew,	ERP, WOI, MIS	
	stay of loading		Port dispatcher, management of the terminal

9	First aid	Written safety instructions	Emergency medical aid, management of the terminal
	Saving	Written safety instructions	Management of the terminal, emergency medical aid-if necessary
	First aid, calling to police	Written safety instructions	Emergency medical aid, management of the terminal
	First aid	First aid training	Emergency medical aid, police, management of the terminal
10			Port dispatcher, management of the terminal
	Stay of loading, inform the saving crew	ERP	
	Localisation of pollution	ERP	Management of the terminal
	Stay of loading, fireguard	ERP	Management of the terminal
	Localisation of pollution, cleaning	WOI	Management of the terminal
	Stay of operations	WOI	Management of the terminal
11	Watching the work of the equipment	Maintenance and equipment schedule	
	Watching, checking		
	Measuring	Technical measures	
	Fireguard	ERP	
12	Starting of the emergency generator	Conducting of the drills	

Attachment 3.

Average volumes of waste water from the terminal phases.

	Volume, m^3/year	**summer, m^3**	**winter**, m^3**
1.1. Rain water*	5 000	3 000	2 000
1.2. Ballast water	-	-	-
1.3. Sanitary waste water	3 000	1 600	1 400
1.4. Boiler blowdown	800	300	500
1.5. Process water*	1 000	700	300
1.6. Tank drainage water*	50	30	20
1.7. Spillage water	100	50	50
1.8. Fire water	400	300	100
1.9. Cooling water	100	50	50
1.10. Condensate	2 000	1000	1000
- Dry weather flow	m^3/d	1	1
- Wet weather flow	m^3/d	30	10

* Through the oil separation and waste water treatment system.

** November, December, January, February, March (**Assume to be winter months)

Average rainfall quantities in Tallinn.

1. January	34 mm
2. February	27 mm
3. March	25 mm
4. April	36 mm
5. May	44 mm
6. June	51 mm
7. July	70 mm
8. August	78 mm
9. September	71 mm
10. October	66 mm
11. November	56 mm
12. December	42 mm
TOTAL	600 mm/year

Mr. Pekka Rautiainen
Director of Information Services
Finnsteve Oy Ab, Finland

INFORMATION SYSTEMS IN MODERN CONTAINER

Information technology and environment

- Increase
  - preplanned traffic and movements
  - accurate operations
  - reliability
  - performance

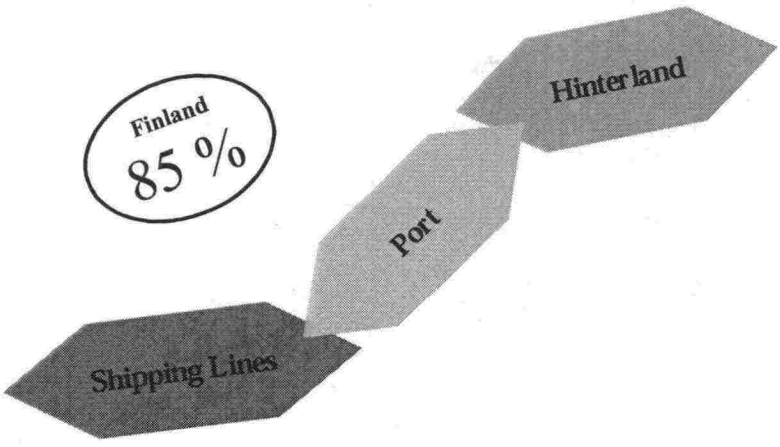
+ 33 %

- Decrease
  - use of energy
  - unnecessary operations
  - errors in operations

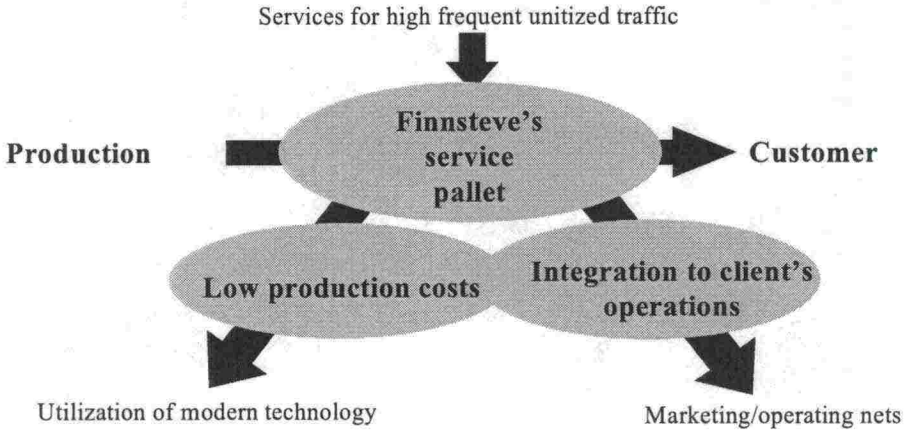
- 33 %

Bytes don't cause pollution!

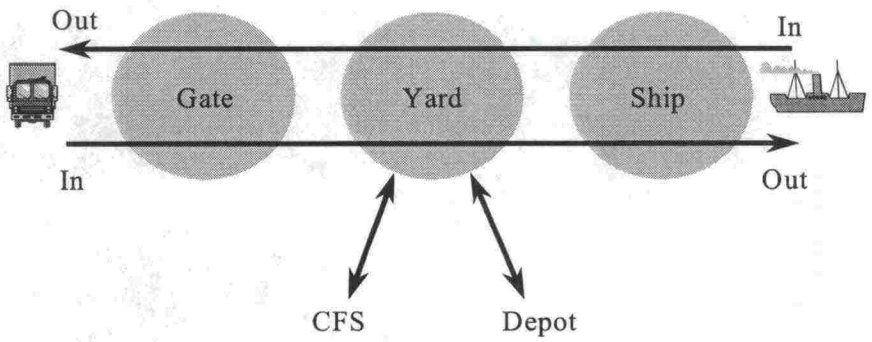
Port in the logistics chain



Finnsteve's business idea

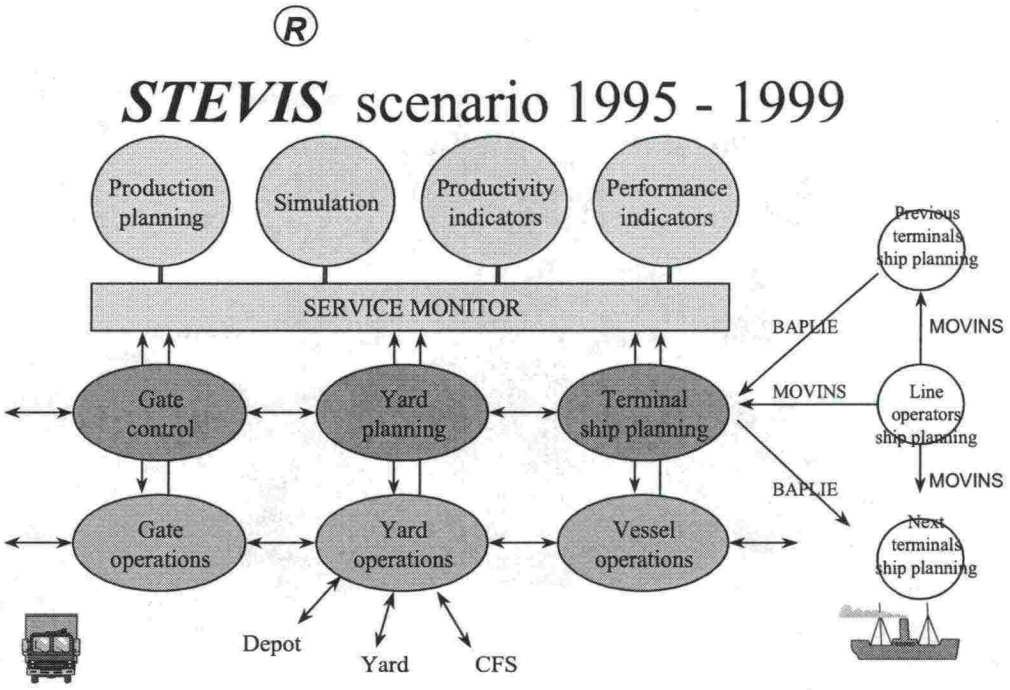


Container terminal's service process

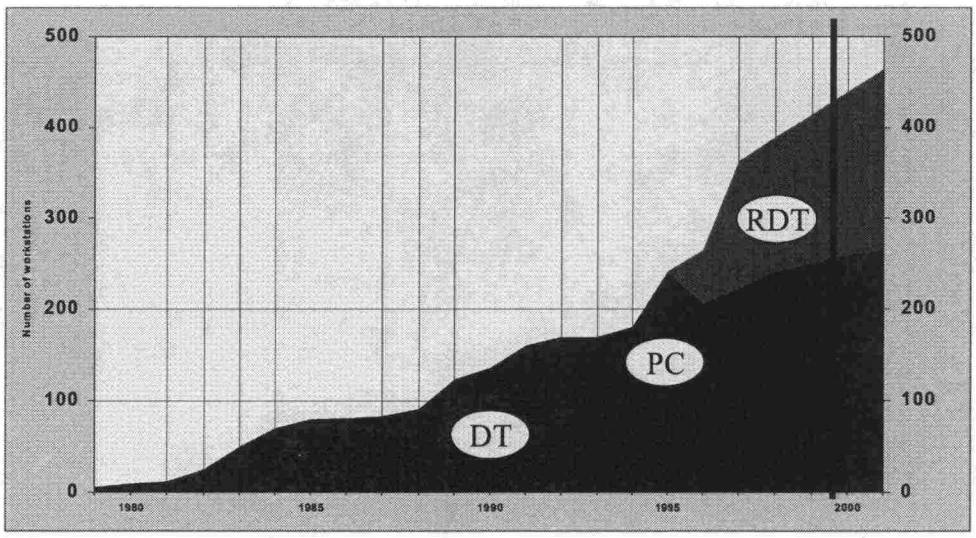


Basic applications in container terminal

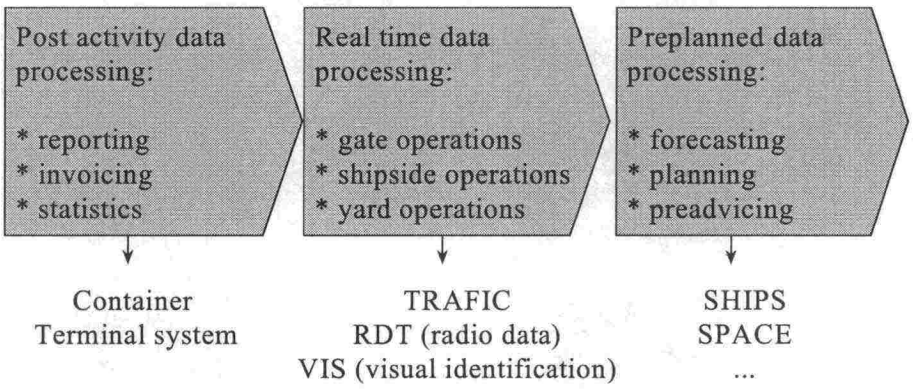
- Base system for container management (*STEVIS*)
- Subsystems
  - Gate control
  - Yard planning (SPACE)
  - Ship planning (SHIPS)
  - Traffic control (TRAFIC)
  - Tally
- Communication
  - Radio data terminals (RDT by LXE)
  - Electronic data interchange (EDI by Elma)
  - Customer access (Extranet applications)



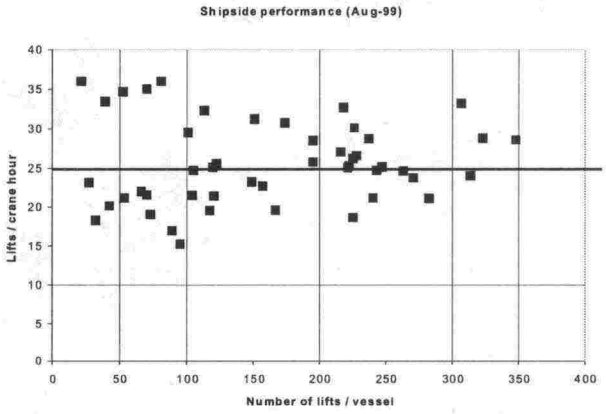
Utilization of information technology



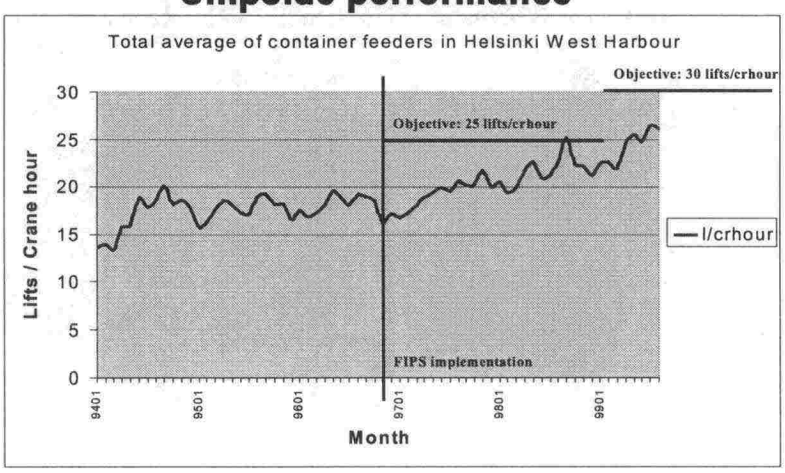
From data collecting to preplanning



Performance distribution



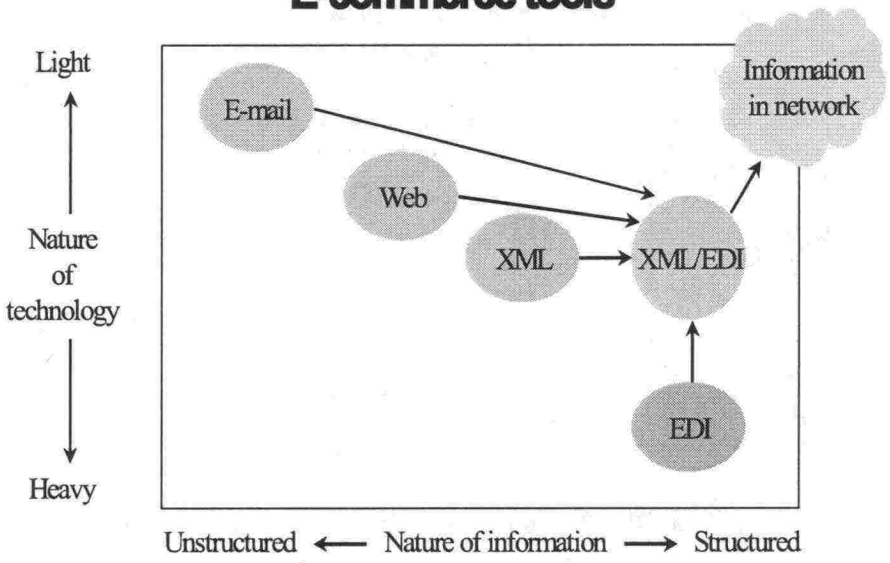
Shipside performance

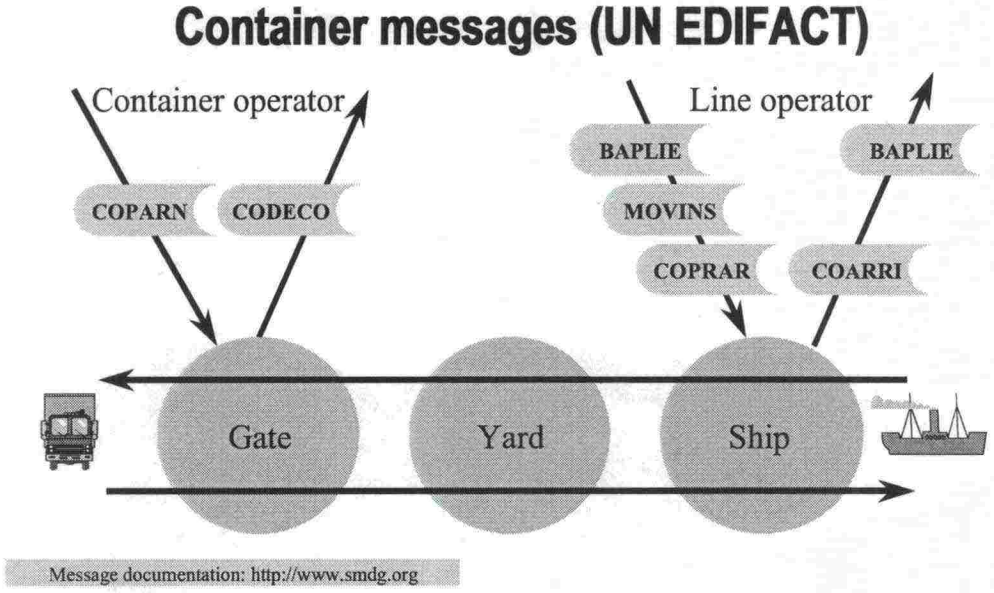


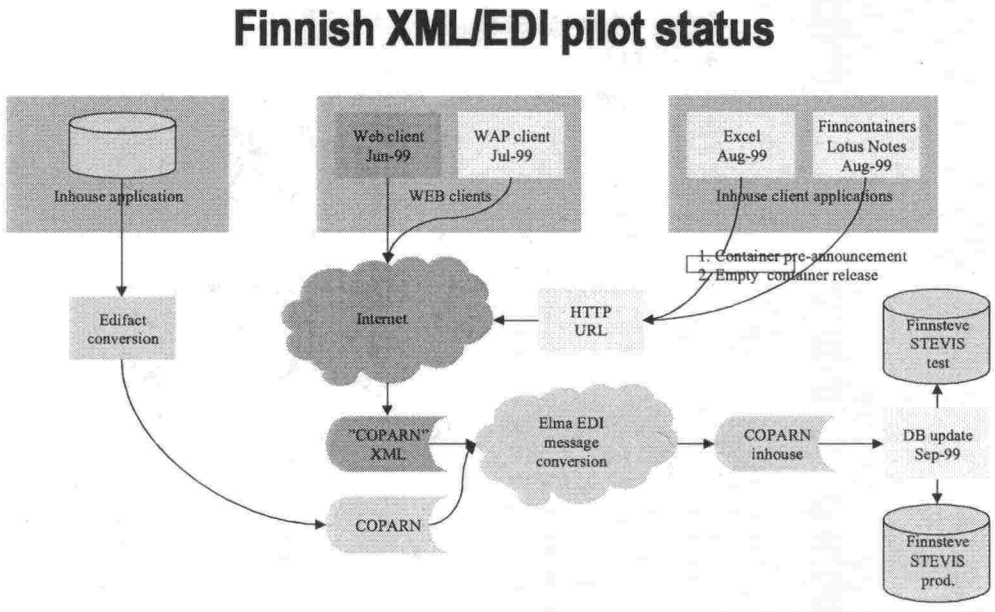
Key technologies for transportation

- Communication technology
  - EDI and XML/EDI
  - Web based trading applications and services
  - Mobile computing
- Security technology
  - Remote readable tag's
  - Visual identifying
  - Electronic signature
  - Electronic seal

E-commerce tools




Container messages (UN EDIFACT)
Container operator
Line operator
BAPLIE
BAPLIE
COPARN
CODECO
MOVINS
COPRAR
COARRI
Gate
Yard
Ship
Message documentation: http://www.smdg.org


Finnish XML/EDI pilot status
Inhouse application
Web client Jun-99
WAP client Jul-99
WEB clients
Excel Aug-99
Finncontainers Lotus Notes Aug-99
Inhouse client applications
1. Container pre-announcement
2. Empty container release
Edifact conversion
Internet
HTTP URL
Finnsteve STEVIS test
"COPARN" XML
Elma EDI message conversion
COPARN inhouse
DB update Sep-99
COPARN
Finnsteve STEVIS prod.

Use of visual information

- Human interface
- Remote services via video camera network
- Damage reporting
  - IMC DICAMOS in Sompasaari
- Visual identification
  - licence plates
    - pilot in Vaalimaa
  - container numbers
    - pilots in Hessenatie and ECT
- Document scanning

Mobile computing

- Trucker as a real time player
  - mobile Internet access
  - mobile messaging
- Highway access
- Mobile phone as a data terminal
  - WAP and WML
  - UMTS (Universal Mobile Telecommunications System)
  - etc

Trends in mobile "phone" technology

- WAP phones and services available (Sep-1999) WAP
- Bluetooth in mobile phones introduced (Jun-1999)
- Higher transmission speeds
  - 1999: 9,6 kbs (GSM data)
  - 14,4 kbs (HSCSD, high speed circuit switched data)
  - 2000: 43,2 kbs (HSCSD + time frames)
  - 115 kbs (GPRS, general packet radio service) IP phones
  - ~ 384 kbs (EDGE, enhanced data rates for GSM evolution)
  - 2001: ~ 500 kbs (UMTS phones, IMT-2000)
  - 2002: ~2000 kbs (high speed UMTS networks)

Mr. Risto Hakala
General Manager
Enrocon Ltd, Finland

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) IN PORTS – FROM THE LEGISLATION POINT OF VIEW

In the countries around the Gulf of Finland have many projects to construct new or develop old ports. This paper describes the Estonian, Finnish and Russian environmental legislation concerning the development and construction of ports in the Gulf of Finland. In the ports all the pollution sources of water, air and soil can be found. The environmental facts play very important role in the design and use of ports. The countries around the Gulf of Finland have adapted the EIA procedure the permit to build the ports.

The environmental legislation system in Russia

The federal environmental legislation is based on the Acts of the Natural Resources and the Act of the of the Environmental Protection. These are completed with federal construction and hygienic norm and regulations, local norms given by the republics, regions and the cities of Moscow and St. Petersburg and some international agreements.

The general base for environmental protection is given by the Russian federal law Protection of Natural Environment from the year 1991 and its revision from the year 1993. This law gives the general principles of protection of the natural resources and the environment. Protection of human life and heath and reasonable use of natural resources is it basic rules. The law concerns all construction branches and it regulates planning, design, construction and the use of all buildings and structures.

The laws, acts and regulations of 'Ecological expertise' is another group legislation of environmental protection. They influence on all technical-economical reports, the design of new buildings and renovation design or construction of the projects which have been interrupted, if they effect directly or indirectly on nature.

The 'Ecological expertise' specifies that EIA must be present together with the documents of 'Ecological expertise'. EIA must be involved in all official phases of construction projects in spite of size and the duration of the project. These facts only effect on the size and consistency of the EIA.

EIA in Russia (attachment 1)

The Russian Ministry of the Nature have ratified 18.07.1994 the Act 'Environmental Impact Assessment in Russian federation'.

Construction process is divided in sections

1. The feasibly study of the investment (the aim)
2. The preparation the bases of the construction investment.

EIA process is treated by the officials in the following phases:

The aim of the investment (voluntary but recommend)
The argumentation of investment
Technical-Economical document (TEO)
Design and cost estimate
Construction
Transfer to the use

In the first phase the investor will specify mainly the technical and economical matters like scope of the port, import and export products and their amount, transport capacity, ship size, proposals for technical shames and necessary land resources required for the development.

The phase two includes preparation the TEO (Technical-Economical Document) which is normally the basic document for permit for the development of the plot. After approval of TEO the construction process includes the parts of the design, construction and approval for the use.

Each face consists of five steps which are
1. Reparation of the announcement plan of the environmental assessment
2. Drawing up the announcement plan of the environmental assessment
3. Public hearing for the approval of the object
4. Approval of the list of ecological conditions and demands by the environmental protection officials
5. The presentation of the results of EIA

Environmental legislation system in Estonia

In Estonia like in Russia bases for environmental protection legislation have been prescribed in very short time. However the lack of the regulations and the guidelines which completes the laws have caused some applying problems.

The environmental legislation of Estonia is based on the Constitution, on the Act related to Protection of Nature from the year 1990 and on the Act on Sustainable Development from the year 1995. In the constitution the natural resources are national property of Estonia. They should be used economically.

The act related to the Protection of Nature provides a legal basis for the preservation of the conditions of natural and living environment and for sustainable use of natural resources. The act covers both the basic principles of nature conservation and the use of nature: soil, minerals, water, air, wildlife, waste and their monitoring and maintaining the information.

The Act of Sustainable Development is a framework law which establishes the principles of national strategy of sustainable development. Its principles comes from the decision of UNCED.

EIA in Estonia (attachment 2)

EIA is regulated by the Regulation of the Estonian Government on 'Environmental Impact Assessment' from the year 1992. To comply with this document, the Regulation of the Minister of Environment Methodological Guidelines for Implementing Environmental Assessment in Estonia was issued in 1994.

This regulation lays down the procedure of EIA and gives a developer advise on what data is required to be submitted to the competent authority. It also provides experts with practical assignments as to what should be undertaken to prepare an EIA. EIA procedure is a part of project screening and consultation procedures between different involved departments of local/regional or general government before granting planning, development or environmental permits.

Projects which need EIA are divided in local and state importance. They can be obligatory or under consideration. On port construction following projects are under EIA:

State/ obligatory

Ports, roads and railways
Dredging and filling of water areas
Oil terminals over 5000 m^3

Local/ obligatory

Stores of dangerous materials
Oil tanks from 110 m^3 to 5000 m^3

Under consideration

Filling of sea areas
Stores of chemicals
Construction and renovation of harbours, roads, railways

Environmental system in Finland

The most important laws concerning the development of ports is the Building act, Water law and the law on Environmental Impact Assessment. Other laws effecting directly or indirectly are the laws of Sustainable Development, Law on Environmental Protection, the Acts on Solid Waste Management, Air Pollution Control and Noise Protection. Other matters which effect on port projects are Natura 2000, the new regulations and guidelines of ship waste receipt by EU and international agreements like Helcom.

The most important international (voluntary) environmental standards is ISO 14001 which includes the requirements for the environmental system and it helps to recognise the environmental impacts. The European Committee for Standardization (CEN) has adopted it as European Standard.

The main phases of ISO 14001 -standard are: the state of art review of recognition of the environmental facts, identification of the environmental impacts, look for the relevant mandatory and voluntary regulations, create the environment policy and the quality system.

EIA in Finland (attachment 3)

The aim of the EIA is to promote Environmental Impact Assessment and adapt the environmental view for the design of the building process and the people more information and a chance to influence on the building process.

The environmental impact means direct or indirect influences in Finland or its nearby areas as follows:

- Human health and living conditions and pleasant environment
- Soil, water, air, climate, flora, fauna and their mutual relations and the pluralistic of the nature
- Community structure, buildings, landscape, cityscape and cultural heritage
- The use of natural resources

The port projects in which EIA is applied are:

The storage tanks of Oil, petrochemical and chemical products, storage volume over 50 000 m^2. Sea fairways over 8 meters deep and the ports to which this size or deeper fairways lead. Also other project can be considered to be taken under EIA if they have remarkable effect on environment.

Conclusions

Finland and Estonia have much similarity in environmental requirement in construction sector. In Russia the contains of the norms and the design and construction practice is different. Also the acquiring of the building plot and its development is different procedure in Russia.

The highest governmental authority is in Finland and Estonia Ministry of the Environment, but in Russia a State Committee. Connection authority in port projects in Finland is Finnish Environmental institute. In Estonia in the projects of state importance the responsibility is in the Ministry and in the projects of regional importance in the local level. In Russia the authority is the regional environmental authority, but the approval of design documents will be done practically in all cases in the federal level in Moscow.

In Russia the legislation concerning ports have many steps. In practice the control is done according the laws, acts and norms which have been given by many Ministries and State Committees and according to regional acts and regulations.

In Finland EIA have been directed with the law and an act which completes the laws. In Estonia EIA has been directed with a governmental act and completed with regulation of the Estonian Ministry of the Environment. In Russia there is also given environmental regulations in building norm level.

In all the tree countries EIA is needed in port projects in some level. In Russia it is necessary in all projects. In Estonia it is divided to the projects of state and local importance. In Finland the projects have been pointed out exactly but however the law the gives for the Ministry of the Environment the right to apply EIA process to the other projects, if it regards it necessary.

In Russia EIA is necessary and advisable already in planning of the investment and it is obligatory document in all official construction phases. The construction procedure differs from that in Finland and Estonia where the investor pays the plot or rents it and then makes the designs. In Russia the officials will first give you permit to prepare TEO and after the officials have approved it they give the right for the site.

There is also some differences in making the EIA. In Russia and in Estonia the consult needs a license. In Estonia the EIA is prepared by the authority or a consultant which the authority have chosen.

Summary table of EIA in Finland, Russia and Estonia.

SUBJECT	Finland	Russia	Estonia
EIA legislation	Yes	Yes/act of Ministry	Yes/regulation of the government
project	Fairways over 8 m deep and port to them	Practically all projects	Port Dredging
Competent authority	Regional Environment centres	Local environmental authority/ Federative treatment and approval	Ministry of the Environment Local environmental authority/
Time of action	Before essential construction work which could effect on nature	Feasibly stage (recommend) TEO	Before building permit
Content	Defined in act	Defined EIA epochs	Defined in the ministers regulation
Maker	Not defined	License obligatory	License obligatory
Responsible of EIA	Investor	Investor	Competent authority
Publicity	Obligatory	Obligatory	Obligatory

Attachment 1.

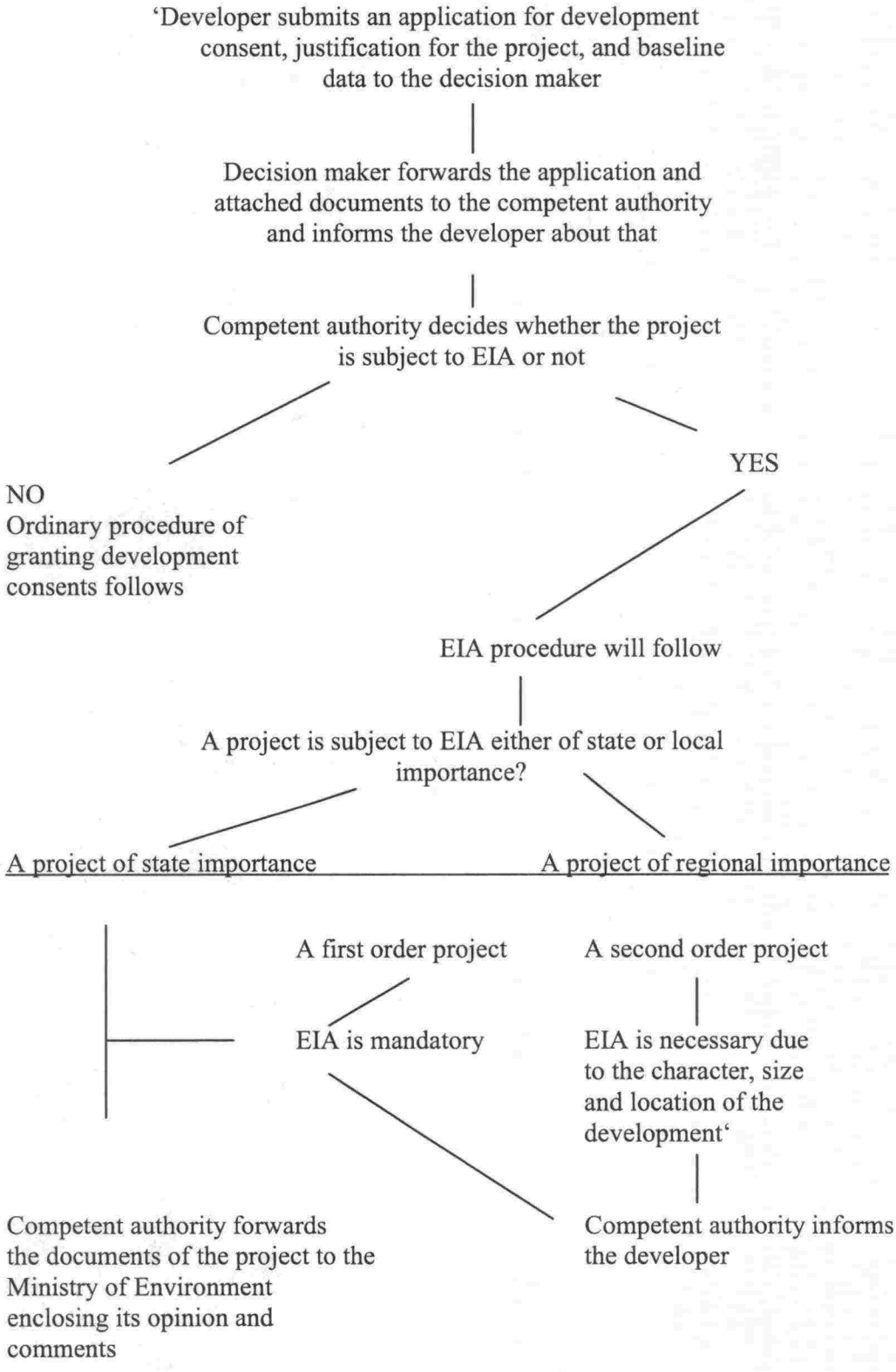
EIA procedure in Russia.

Construction process	**Official action**	**Scope of EIA**
1. The feasibly study of the investment		Reparation of the announcement plan of the environmental assessment (voluntary in this stage content see below) Recommend minimum action: Environmental assessments which directs to alternative sites
2. The preparation the bases of the construction investment: The argumentation of investment	Preliminary right for the site and permit to start the TEO ------	--> 1. Reparation of the announcement plan of the environmental assessment • evaluation of the alternative sites • evaluation of the sufficiency of the design data • evaluation of the present environment • evaluation of the possible impacts of the activities • recommendation natural protection to minimise the impact • prediction of the chances in nature and human life
TEO (technical-economical document)	<-- Permit for design of the site	------ 2. Drawing up the announcement plan of the environmental assessment • Condition of the environment and nature • Analysis of the norms and acts which regulate the environmental the use of nature in the site • The environmental assessments caused by activity • Prediction of the change in the environment • The precautions in the case of undesirable incident.
Design The EIA process can be applied in some extension	Building permit and preliminary transfer of the site for construction purposes	

Construction The EIA process can be applied in some extension Transfer to use The EIA process can be applied in some extension	Building inspection and control of EIA Approval of the documents during the construction	3. Public hearing for the approval of the object 4. Approval of the list of ecological conditions and demands by the environmental protection officials 5. The presentation of the results of EIA

Attachment 2.

EIA procedure in Estonia.
(The general public control is exercised in various stages of the EIA process)



Competent authority brings the initiation of EIA
to the public

Competent authority appoints a head of expert
group or selects experts and sets dates

Competent authority together with the head of expert group or single experts
specifies the fields and tasks of EIA

Competent authority together with the head of expert group selects experts and signs
contracts with them

EIA results in the completion of EIS'

1. Baseline data (description of the project, location and environmental condition) and public response;
2. Identification and evaluation of key environmental impacts;
3. Alternatives to the location, project and technological design. Evaluation of rational utilization of natural resources
4. Presentation of main results of E1A. Final statement;
5. Public responses and their considerations.

QUALITY CONTROL STEPS:

Competent authority brings the results of EIA (expert opinions) to the public

Competent authority presents its decision to the
decision maker and; sets conditions worked out on
the basis of EIS.

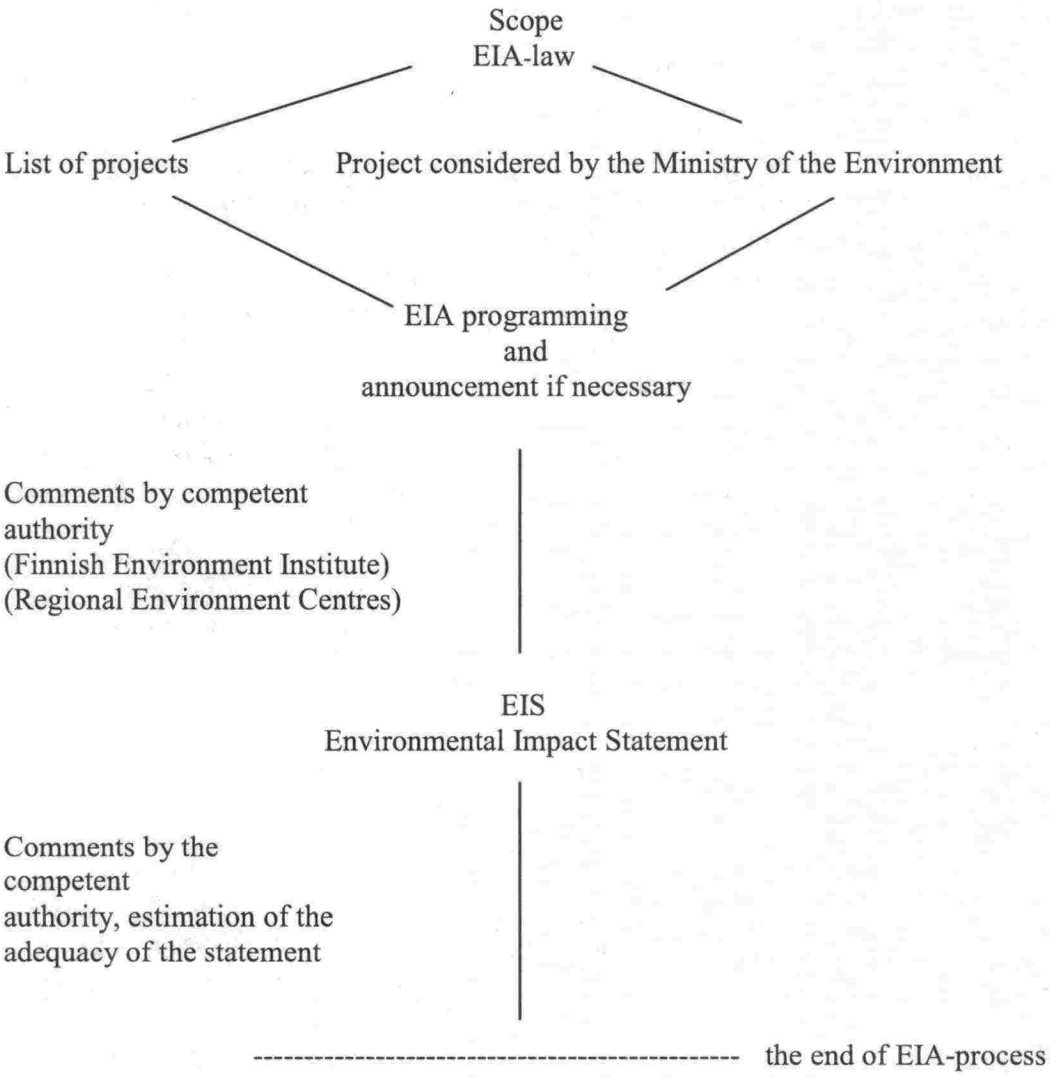
Decision maker decides over the planning and
conditions of the project on the basis of EIS and grants
the development consent.

Decision maker brings his decision on the project
into public.

Competent authority or decision maker, if necessary,
puts environmental auditing forward.

Attachment 3.

EIA process in Finland.



Mr. Jorma Rytkönen
VTT Manufacturing Technology, Finland

THE ENVIRONMENTAL RISK OF MARITIME TRAFFIC AND TERMINAL CONSTRUCTIONS NOW AND IN THE FUTURE

Summary

At the moment, there are several projects underway in Russia to construct and modernise ports in the Gulf of Finland. In addition to the ports of St. Petersburg and Vyborg/Vysotsk, four new large ports are being planned in Primorsk, Lomonosov, Batareinaya and Ust-Luga. In Estonia, port operations have increased intensely, and in 1998, approximately 13 million tons of oil was shipped via the port of Muuga.

Eveb in conservative estimates, the construction of new harbours and the expansion and renovation of old ones is seen as an indirect indication of the rapid growth of maririme transports in the Gulf of Finland. It is estimated that transport performance will double from its present level by 2010 - 2015. Transport of oil products may even increase threefold.

Thus, it does not seem likely that construction work in the current port projects will be carried out very effectively owing to a shortage of investment capacity in Russia. However, the implementation of the port projects will proceed, as there is some concern that if the new oil pipes under construction in Central Asia are not lead through Russian territories, Russia will have to construct alternative routes through its own territories. Focal points in Russian development plans include avoiding transit duties, the development of Russian oil production and competing with other oil-producing countries on the market.

Growth in maritime transports increases the risk of oil spills, the amount of emissions as well as waste left by ships in ports. The Gulf of Finland will also face the special problem of an increased risk of accidents and grounding, with modern maritime traffic control systems should be able to reduce. VTS and AIS systems will play a critical role in the Gulf of Finland in the near future. Managing oil transports, especially during the winter, requires maintaining an adequate fleet of icebreakers, ice-strengthened tanks vessels and convoy tow-boats with oil spill prevention and response equipment designed for conditions such as those in the Gulf of Finland.

With increasing traffic in the area, there is also a growing need to find and plan alternative ship routes for vessels carrying hazardous materials, passenger ships, roll-on/roll-off ships and pleasure and fishing boats. More detailed goals will be required for environmental monitoring and monitoring systems in order to monitor the effects of traffic in the most vulnerable areas of the Baltic Sea, and as far as possible, re-route hazardous sea transports through less vulnerable areas.

A prompt completion of Russian ports does not seem very likely in view of Russia's economic state. After the rouble crisis, which started in August 1998, the value of the rouble has sunk to a third of its then value. In the Autumn of 1998, gross production in Russia fell in only a few months by approximately six per cent. The annual budget deficits of the Russian Federation have varied between 5 and 12 per cent of the GNP. The annually accumulated deficit stands around $20 billion. Any major economic policy reform is unlikely before the presidential election in 2000. The latest sudden increase of the crude oil market price, however, can accelerate the need of harbour and terminal constructions unpredictably.

This presentation is connected with a joint research project by VTT and the Institute of Limnology in St. Petersburg called 'European Maritime Transport Development – Technological Improvements of the Ecological Safety in the Gulf of Finland'. The research project is divided into several stages, which the parties hope to launch and implement in co-operation with the states surrounding the Gulf of Finland. The work in Finland has been co-ordinated by Mr. Jorma Rytkönen of VTT whereas the Russian supervisor has been Prof. Vladeslav Roumiantsev of the Institute of Limnology of RAS.

Mr. Alexander A. Startsev
General Director
St. Petersburg Shipbreaking Yard, Russia

CLEANING OF THE MARINE ENVIRONMENT FROM OLD AND SUNKEN SHIPS AND VESSELS

Ladies and Gentlemen!

I am very happy to greet you all here, and pass my special gratitude to the Ministry of the Environment of Finland for their giving me the opportunity of presentation at this seminar.

I am pleased to let you know that for last 10 years our ship-disposal plant in St. Petersburg has been involved in protecting the Gulf of Finland and ports of the Leningrad region.

I think that everybody knows what kind of problems outdated written-off ships (especially those submerged in the mooring areas) present for navigators and administrations of ports. According to results of the summer inspection of water areas of ports in the Eastern part of the Gulf of Finland – there have been detected 150 submerged ships and vessels.

The activity of our enterprise includes clearing ports and navigation areas from old written off ships, raising submerged vessels and their following disposal. We also deal with salvaging outdated armaments, military equipment and munitions accumulated in the Leningrad region in amounts of hundreds thousands tons.

For the last years the enterprise specialists have been disposed 110 ships including 12 submerged ones which had been raised by company. The total dock weight of utilized vessels amounted to 70 000 tons (equal to 1 200 railcars loaded with metal scrap). The most difficult and labour-intensive for utilization were 32 warships, including a cruiser (displacement: 14 000 tons; length: 220 meters) and 8 diesel submarines class 'Whisky' and 'Foxtrot'. Presently two ships and three cruiser submarines are been disposed near the berths of the company.

In May 1998 the enterprise prevented the ecological disaster in the Gulf of Finland, near the city of Primorsk. The threat was presented with the floating barracks 'TOSNA', written off by the Navy Forces; the condition of that vessel, which tanks contained 100 tons of black oil and diesel fuel, was alarming. In case of that vessel's submerging most of oil products would have flown into the Gulf near the coastline of Finland. At the risk and expense of the enterprise the barracks were towed off to the ship-cutting shop, where they are still been disposed. (This very contaminated object is unprofitable for the enterprise).

The above mentioned volume of works implemented by the enterprise means:

- several thousand meters of berthing line cleared for work at the St. Petersburg Sea Port (it is known that written off ships do not stay afloat for a long time, but go down in their last berthing places);
- preventing the penetration of big amounts of heavy metals, oil containing waste and non-metal chemical substances in the water;
- dozens millions dollars saved for the city budget; those money would have been spent on clearing water areas from submerged ships.

I do not exaggerate speaking about millions dollars, as submerged ships paralyse the operation of ports, impede smooth navigation, contaminate water environment, and may grow into a national disaster. The present situation at the Kolsky Gulf of the Murmansk region could be truly referred to as disastrous. There one can find a real 'marine cemetery': about 1 000 military ships, submarines and vessels were submerged there.

Thanks to the activity of our enterprise, the situation in the Eastern part of the Gulf of Finland has not grown in that dangerous direction. However, our efforts remain unnoticed. This situation could be compared with a telephone: when all works well nobody thinks about how the connection is provided; but should the line fail, and the telephone does not work, everybody cries 'help'.

I would like to underline that all ship-raising and disposal works have been performed by the enterprise without any financial support from the state or beyond-the-budget sources. The sea 'cleaner' function is executed by the enterprise after its own initiative and at its own risk and expense. It is done in the interests of providing ecological safety to vital functions of the population in the region, smooth navigation and operation of ports.

You may be willing to ask us how we manage to exercise these activities without becoming a bankrupt under the economic crisis in Russia. Actually, hazardous military and industrial waste management, including utilization of written off ships, and – moreover – clearing water areas from submerged vessels, presents an unprofitable process, which being a part of the state functions, should be properly organized and financially supported.

First of all our enterprise could be proud of its experience, professional team (65 people) and a special equipment. Since 1988 the company has used unique in Russia ship-breaking shares 'Lindemann' (Germany), which power is 2 500 ton/forces and production capacity amounts to 30 ton of metal scrap per hour. (Just for your information: there are just two units of such equipment in the world; the second shares have been installed in Holland. The plant price for these shares is 7 mln DM).

Secondly, even without any support from the state, during several years the enterprise managed to provide self-financing terms to the ship-disposal process thanks to enterprise's mobilizing all internal resources available. Thanks to the reasonable organisation of financial resources and raw materials, that labour-intensive, energy-consuming and disadvantageous ship-salvaging activity was

supported through the high volume of sales in industrial scrap. There is no doubt, that, say, rails are more advantageous for recycling in comparison with submarines.

As a result, disposed ships and vessels made not more than 25 – 30 % in the total final product of the enterprise; the rest 75 % came from industrial scrap and land military vehicles. Of course, metal scrap was supplied to the external market. By the way beginning with 1993 our company has been a permanent supplier of metal scrap to the Finnish steel-metal plant Imatra Steel.

At present due to a number of factors (e.g. fierce competition in the metal-scrap market, decrease in world prices, introduction of export fees, and lack of working capital) this source of support for ship-disposal business gets down, and this activity faces the risk of being shut down.

Having foreseen this unfavourable situation we have undertaken a number of protecting measures: particularly, we have got a support from the Administration of St. Petersburg: two special resolutions of the City Governor have been prepared and issued. We have obtained a first small loan from the North-Baltic Marine Fund, which works under Lencomecologia

However, it is not enough. We understand that a system of measures is needed. It is necessary to build the infrastructure, conduct permanent monitoring of the marine environment, develop hazardous waste industry. In the other words, a new state policy in the field of providing ecological safety is needed. Along with this it is clear that the process can be long and difficult.

Giving a real understanding to the status of environment of the Baltic Sea and taking into consideration the main negative ecological factors in this region, we suggest formulating elements for environmental policy on the basis of co-operation between Baltic Rim countries - right now.

A year ago at the Second World Conference of the main Baltic Rim cities, our company, supported by the Administration of St. Petersburg, generated the initiative. According to one of the paragraphs of the resolution adopted at the Conference it is decided to establish a non-profit organisation in St. Petersburg under the flag of United Nations – The International Center for Ecological Safety of the Baltic Sea Region.

I would like to say a little bit more about this project. Establishing a new structure is not a purpose (there is already enough of various centers and foundations in St. Petersburg). The idea of the project is in preserving experience in the field of hazardous military and industrial waste management and giving it further development under the support of the city and region administration, neighbouring countries of the Baltic Region, and international organisations. Our ship-disposal company and some other enterprises have the above experience.

The Center is being established on purpose to develop international co-operation, aimed at preventing environmental disasters in the Baltic Sea region and providing ecological safety for the entire European Community.

The main task of the Center is putting together efforts of Baltic Rim countries, attracting financial, technical and all possible resources of national and international organisations for the following purposes:

- creating a basis for industrial and system approach to salvaging hazardous waste accumulated in the region;
- developing policies for the ecologically safe management of various types of waste and environmentally friendly industries;
- prompt and effective response to possible natural and technogenic disasters in the region; arranging a rescue service for the population;
- permanent monitoring the Baltic Sea;
- clearing the Gulf of Finland and attached water areas from toxic waste and other explosive- and ecologically hazardous objects;
- providing safe navigation and operation of ports;
- implementing projects, connected with hazardous military, industrial and domestic waste management;
- working out and evaluating environmental investment projects, fostering these projects, including monitoring and analyzing results.

The work on the project of the International Center is supported on the RF level. The United Nations Industrial Development Organization (UNIDO) and United Nations Development Program (UNDP) have already been involved in developing the project. These organizations will become first founders of the International Center.

I would like to draw your attention to the fact that UNIDO develops its own program 'Big marine ecological systems'. Under the UN flag it could be possible to continue putting together efforts of Baltic Rim countries, prepare political grounds for comprehensive co-operation in the field of regional ecological safety, develop and sign a special inter-state agreement and, first of all, provide permanent monitoring of the Baltic region with all resources and facilities available. We hope the Baltic States Council, Baltic Marine Environment Protection Commission (HELCOM), national ecological funds of Baltic Rim countries, technical co-operation agencies, donor-companies and other interested organisations may join the Center as its co-founders in future. The International Center is in the stage of registration yet, but actual co-operation has already begun.

In August this year a joint Russian-Swedish project was launched. It deals with clearing the Big Tuters island and attached water areas in the Gulf of Finland from thousands munitions of the Second World war. Specialists of the Royal Technical University of Stockholm and the 'ALTAIR', special-purpose vessel, take part in the project from the Swedish party. The project is financed by the Swedish Government through SIDA. Our ship-disposal plant acts as a chief operator from the Russian party. Presently, the second expedition works on the island.

To resume all above I would like to say that a real positive change in the status of marine environment of the Gulf of Finland and the entire Baltic Sea depends on practical activities. Results of our company work could be referred to as one of examples of such activities. However, we could do even more. We need assistance and support. We rely on assistance and support of Baltic Rim countries.

Mr. Valdo Välja
Head of Port Register Bureau
Estonian National Maritime Board

PRESENT AND FUTURE PLANS IN ESTONIAN PORTS

Dear chairman,
Dear ladies and gentlemen!

I would like to thank the organisers for this opportunity to introduce you the development of Estonian ports over ages. One of the main tasks for Estonian water transport in near future (in years 1998 - 2000) is the development of ports' infrastructure.

1. The development of ports in the past

The role of ports in Estonian life has been and still is on a very important place. Already in the past, settlements were established near water that later developed into ports. Two of the biggest seaports – Tallinn and Pärnu – as well as two inland ports – Viljandi and Tartu – belonged to the Hanseatic League.

The study I made in 1993 - 94 was titled 'Estonian Ports Prior to WW II up to Present Day'. It may seem strange that Estonian National Maritime Board (ENMB) does not know Estonian ports. It should be mentioned that in Soviet Estonia there were only two ports open to foreign ships: Muuga harbour and Vanasadam harbour. Many ports were under the authority of the SU Navy, the rest were used by fishermen, and a lot of small ports were closed as our country was surrounded by the SU border zone. To my great surprise I discovered that before WW II in Estonia there were 859 seaports, boat harbours, small harbours and landing places. In addition to this there were 228 ports on inland waterways.

As of January 1, 1998 according to the Statistical Office of Estonia, in Estonia there are 1521 islands, the length of waterways at sea is 1640 km and in inland 520 km, therefore we have such a great number of ports.

According to ENMB there are 101 ports of different size. 31 of these are engaged in merchant shipping. All Estonian commercial ports are open to foreign ships. According to ownership there are different types of ports: state, municipal and private ports. For example: Hundipea port is a state port, Kunda port is a private port and Pärnu port is a municipal port. The percentage of ownership cannot be exactly determined as this process is still on the way.

My presentation will briefly touch upon the following points:

1. Ports in Tallinn and Estonian coastal area.
2. Ports and small harbours in western Estonia and on islands.
3. Ports that are visited by offshore yachts and motorboats.
4. Inland ports.
5. Maritime legislation.
6. Marine statistics.
7. Environmental investments in port.

2. Ports in Tallinn and Estonian coastal area

Estonian biggest ports lie in Tallinn area due to the closeness of trade routes, great depths, winter that is sometimes mild (i.e. temperature above 0) and easy entrance. The ports of Tallinn own better equipment and during rough winters normal navigation in ensured thanks to ENMB's icebreaker 'Tarmo'. The Government of the Republic Regulation No. 4 from January 5, 1999 sets out that the ports of Paldiski, Kunda port and Pärnu port in addition to the ports of Tallinn are to be ensured with the icebreaker service in winter. Kunda port and Paldiski port lie on northern coast and Pärnu port in South-East Estonia that thanks to this regulation is navigable all the year round. Considering that the greater part of transportation of goods forms transit from Russia, it could be said that the importance of Pärnu port has grown for Estonia. Ships, cargo transporters, cargo owners and passengers may receive the following services in every port: stevedore, agency, forwarder, auxiliary vessels and passenger services. Big ports are of Landlord type and port owners have rented out port's infrastructure that is meant for cargo loading, unloading, storage and processing.

The coast of Estonia and islands are covered with small harbours and about 90 % of Estonian ports are small ports. 70 % of small ports have the depth at berth approximately 2,0 m.

3. Ports in western Estonia and on islands

The connection between the mainland and islands is of great importance to the development of islands. The connection is ensured mostly with Ro-Ro ships. There are six Ro-Ro routes and four mail boat routes. Table 1 shows the depths of small harbours. Water-level in these ports changes considerably and it is not possible to use big ships.

Table 1. Depths of Estonian small harbours on western coast and islands.

Virtsu	up to 5,8 m
Kuivastu	up to 5,6 m
Roomassaare	up to 5,5 m
Veere	up to 4,9 m
Rohuküla	up to 4,5 m
Heltermaa	up to 4,5 m
Sviby	up to 3,5 m

A few words about the passengers using Ro-Ro ships between the mainland and islands. Table 2 shows the number of passengers which is growing constantly, but not as fast as on international routes. It is because the population on islands is not very big and the fare is becoming more expensive every year.

Table 2. Number of passengers on local Ro-Ro ships.

1993	**1994**	**1995**	**1996**	**1997**
900 700	930 500	1081 100	981 200	1 099 500

Our ports are constantly under reconstruction as shipping companies are bringing better and bigger ships into usage. The government supports small harbours either directly from the state budget or through regional programmes. Islands Programme that is under the authority of Estonian Regional Development Agency is directed to the islands with permanent population. This year Islands Programme has got 10 million kroons. In addition to that 16 - 18 million kroons are given for the maintenance of Ro-Ro ship ports. Table 3 shows the amount of money form the state budget for the maintenance of ports (is not increasing fast enough).

Table 3. Maintenance costs from the state budget for ferry ports in kroons.

1993	**1994**	**1995**	**1996**	**1997**	**1998**
1 900 000	2 300 000	13 000 000	16 000 000	16 000 000	18 000 000

4. Ports visited by offshore yachts and motorboats

We have about 40 ports like this. The condition of these ports varies. There are ports that comply with international standards and there are ports that leave much to wish for. One cannot always blame local people and think that they lack good will. The main reason for lagging behind is that they do not have clear perspectives concerning development, and therefore no investments.

The number of people engaged in marine tourism is growing from year to year and it means an increase in the number of boats in small harbours. It should be mentioned here that this area of tourism is dependent on other factors like the length of summer (in Estonia it is about 3 months) and weather. The ports are faced with growing demands from tourists as they wish to rest comfortably and safely in a beautiful place. In order to keep tourists visiting, a lot of work is done in these ports, e.g. services, safety, marine environment protection. Environmental requirements have increased especially in waste processing, i.e. garbage, engine oil waste and hazardous waste collection and discharge from ports. This requires more investments into ports.

Table 4 shows the number of visits to Estonian ports. The data comes from a Republican Association 'Keep the Estonian Sea Tidy' that co-ordinates European Blue Flag movement in Estonia. As you know, environmental requirements for a Blue Flag Port are high and waste processing has to be well organised.

Table 4. Traffic in Estonian ports.

	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Offshore yachts, motorboats	1 590	3 000	4 340	5 410	5 250	8 310	7 525
Passengers	7 000	11 500	16 800	20 430	18 340	31 330	27 260

At present there are 6 Blue Flag ports in Estonia: Pirita, Haapsalu, Pärnu, Nasva, Roomassaare and Vergi port. At the same time we know that in Finland there are 36 and in Sweden 45 Blue Flag ports. Finland has also three and Sweden 40 Blue Flag beaches, while in Estonia we have only one Blue Flag beach in Pärnu.

Table 5 shows the number of offshore yachts and motorboats and passengers according to countries. It could be seen that Finnish tourists are the most active visitors. Many Swedes, Germans and Englishmen have also discovered Estonian small harbours for themselves.

Table 5. Offshore yachts and motorboats calls in 1998 according to countries

Country	**Yachts, boats**	**Passengers**
Finland	5 712	19 665
Estonia	960	4 839
Sweden	515	1 517
Germany	125	433
Great Britain	55	133
others (14 countries)	158	669
TOTAL	7 525	27 600

5. Inland ports

The biggest river port is Tartu Riverport that connects Tartu port with Lake Võrtsjärv, the Suur-Emajõgi, the lower course of the Narva River, the Narva Water-reservoir, the Velikaja River, Lake Peipus and ports of the Pskov River. At the present moment traffic there is disturbed, as the boundary issue with Russia is not settled yet. Local officials and people are very interested in the revival of traffic there. Another area with water traffic is the upper course of the Narva River. There is mainly domestic passenger traffic between Narva and Narva Jõesuu during the summer season.

I would like to point out that in the Association of Estonian Small Ports has been founded for reconstruction, development, protection of interests, construction and creation of economical database. There belong small seaside harbours as well as inland ports.

6. Maritime legislation concerning ports and maritime activities in ports

After the break-up of the SU and after Estonia regained its independence there appeared a big gap in legislation. The first act to touch upon the definition of port, port documentation, port owner's duties and supervision in port was Ports Act. This act regulates activities in port on legal basis without restricting owner's business activities. Ports Act was accepted on October 22, 1997 and entered into force on January 1, 1998. The Government of the Republic and the Ministry of Transportation and Communications have issued many regulations resulting from this act. A number of specialists from the ministry and ENMB took part in the preparation of many regulations. This process is very complicated and time-consuming, and it should be noted that there is still a lot of work to be done.

7. Maritime statistics

Maritime statistics is organised by the Statistical Office of Estonia in co-operation with ENMB. A real revolution has taken place in that field. Special reports are worked out that ports file in. We get our information on the activities of ports from there. The aim of these reports is not to restrict or inspect merchant shipping, but Estonian Republic (ENMB) has its duties in constructing and maintaining waterways and aids to navigation, also organising the supervision of handling dangerous goods. If the Government did not have such information, it would be difficult to plan and give financial support for fulfilling these functions. All the statistical tables are compiled according to the data from the Statistical Office of Estonia.

Here you can see the development of Estonian ports in numbers. Table 6 shows the yearly increasing traffic through Estonian ports both form Estonia and to Estonia. Table 7 shows the amount of loading (export + outbound transit) and unloading (import + inbound transit). As you could see the growth is very intensive.

Table 6. Traffic through Estonian ports.

	1996	**1997**
Ships from abroad	8 683	11 506
Estonian ships	3 065	4 460
foreign ships	5 618	7 046
Finland	1 957	2 124
Sweden	310	428
Germany	191	247
Russia	1 131	1 622
Other	2 029	2 625
	1996	**1997**
Ships to abroad	8 701	11 410
Estonian ships	3 067	4 386
foreign ships	5 634	7 024
Finland	1 956	2 096
Sweden	310	423
Germany	197	237
Russia	1 140	1 643
Other	2 031	2 625

Table 7. Cargo traffic through Estonian ports in tons

	TOTAL	export	import	outbound transit	inbound transit
1993	11 604 000	1 253 000	505 000	4 759 000	5 087 000
1994	11 788 000	2 446 000	997 000	5 043 000	3 302 000
1995	14 675 000	3 966 000	1 842 000	7 373 000	1 494 000
1996	17 694 000	4 168 000	2 245 000	9 296 000	1 979 000
1997	23 253 000	5 622 000	2 860 000	13 141 000	1 616 000

It can be seen that transit forms a greater part of work done in ports. The biggest partner in transit shipping is Russia. Table 8 expresses traffic through Estonian ports as seen from Germany, Sweden and Finland. You definitely notice that the difference in dynamics is big. The number of passengers from Germany is increasing, from Sweden it comes in surges and now the number increases. If we take a look at the number of passengers from Finland, we see that it increases and it is definitely good news to our port owners. Tallinn Vanasadam Harbour has undergone a major development thanks to Finnish tourists who, for example, in 1997 formed 92,5 % of passengers in Helsinki-Tallinn-Helsinki route. This route was opened in 1965. During the Soviet time there was only one trip to Helsinki, but now there are 25.

In 1994 Finnish ships started to operate on this route. As visa is no longer required for going to Finland, the number of Estonian passengers has increased and it must be said that it hasn't reached its peak. It may be predicted that in the future Vanasadam Harbour will be open for tourists only.

Table 8. International passenger traffic through Estonian ports, number of passengers

	1993	1994	1995	1996	1997	1998
Total from abroad	1 268 800	1 269 900	2 141 600	2 534 000	2 863 200	3 163 238
incl. Finland	1 094 000	1 104 800	2 004 700	2 361 300	2 623 900	2 897 154
Sweden	158 900	157 600	109 500	137 800	165 200	200 250
Germany	3 000	13 000	1 700	2 000	500	14 402
other	12 100	21 500	25 800	32 900	46 600	69 432
from these cruise ships	...	...	...	553 400	664 600	745 418
Total to abroad	1 234 100	1 272 100	2 131 300	1 978 100	2 189 800	2 425 729
incl. Finland	1 078 100	1 088 300	1 999 000	1 846 400	2 027 700	2 230 691
Sweden	137 700	148 200	105 900	130 800	158 700	184 998
Germany	1 000	10 200	1 200	400	500	9 774
other	17 200	25 400	25 200	500	2 800	266
TOTAL	2 502 900	2 569 000	4 272 900	4 512 300	5 026 000	5 588 967

8. Environmental researchs

As my speech was to be performed within marine environment session, while preparing for this seminar I organised a special study in ports concerning their environmental investments in years 1993 - 2000. Allow me to conclude by presenting this data, which shows that years are not alike if we consider the investments made (table 9). Also, economical situation in ports varies. Table 10 shows exactly where in Muuga Harbour environmental investments, made in 1993 - 2000, are used.

Table 9. Investments in Estonian ports in 1993 – 2000.

	Total
Miiduranna harbour	1 262 000
Muuga harbour	22 507 634
Paldiski Lõunasadam harbour	1 641 500
Paljassaare harbour	1 435 000
Patareisadam harbour	335 400
Veere harbour	35 000

Table 10. Investments in Muuga Harbour in 1993 – 2000.

Marine environment monitoring (1996 - 1999)	1 850 984
Oil pollution combatting equipment (1996)	3 556 000
Air monitoring station (1998)	2 159 000
The analyses of the sea water at the aquatorium (1996 - 1999)	265 000
Randvere beach monitoring (1995, 1996, 1998)	114 900
Expert assesment to the pollution of seabed (1996)	69 150
Ecological assesment to berth no. 7 (1996)	42 000
Ecological assesment to harbour surroundings (1995, 1996)	130 300
Maintenance of recovery equipment (1996 - 1999)	1 450 000
Surveys of sanitary protection zone (1995)	87 300
Construction of recovery equipment (1994)	12 387 000
TOTAL	22 507 634

Estonia has a lot of work to be done to change the attitude to more environmental-friendly. Once the privatisation process in Estonia is over, I believe that investments into environment increase and the attitude concerning marine environment changes, it is well understood that one has to pay for his carelessness, the later the more. And this money will not be provided by the state, but by the owner himself.

For this presentation I obtained information from
1. Estonian Marine Tourism Association,
2. Association of Estonian Small Ports,
3. Port owners,
4. the Statistical Office of Estonia,
5. the Ministry of Transport and Communications,
6. Republican Association 'Keep the Estonian Sea Tidy',
7. ENMB.

Thank you for your attention and patience during my presentation, and if you have any questions I would be glad to answer them during the coffee break.

Ms. Siiri Baciauskiene
Head of the Waterborne Transport Infrastructure Division
Ministry of transport and Communications of Lithuania

presented by
Mr. Juozas Karalavičius
Head, Environment Protection Department, Klaipeda
State Seaport Authority, Lithuania

PRESENT AND FUTURE PLANS IN LITHUANIAN PORTS

The global economy increasingly depends on an efficient and cost effective transport and port system. In the intermodal transport chains ports as important centres of regional economic and social development are major nodal points. Being in constant competition for trade, the Baltic seaports have remarkable development potential.

Klaipeda State Seaport, the only seaport in Lithuania, is vital to our country both in terms of trade and transport. Klaipeda Port is governed by the State Seaport Authority (founded in 1991) what owns all the Port infrastructure, the Port land and water area. In total the Port covers 1038 hectares of area: 415 hectares of the territory and 623 hectares of the water area. The total length of various berths in the Port is 19216 m.

At present the Port annual cargo turnover is 15 - 16 m tonnes of what more than 70 % is transit cargo. It makes almost 20 % of all goods loaded and unloaded in the ports of the eastern coast of the Baltic sea. The actual capacity of the Port at present is 20 - 22 m tonnes cargo per year. According to the studies carried out by EU experts, by the year 2015 cargo volumes in the Klaipeda Port are estimated to reach 35 million tons.

The biggest stevedoring company in the Port is stock company Klasco. Klasco's cargo turnover in 1998 was 8,2 m t – metals, containers, grain, fertilisers, foodstuff and other what made 54,7 % of the port's total annual turnover. The company began recently to operate a new cold store and has enlarged it's roofed storage areas up to 47 000 m^2. Just to mention some other big stevedoring companies: 'Klaipedos Smelte' is specialised on foodstuff cargo (including refrigerated foodstuff), timber, metal scrap, fertilisers (cold stores available as well). 'Bega' - a rapidly growing new modern flexibly operating company - is handling liquid, bulk and bagged mineral fertilisers, cement, sawn wood, others. 'Klaipedos Nafta' modernisation of which was completed this year is able to handle annually up to 7 m tonnes of all types oil products. The consortium 'Klaipedos Terminalas' is handling mainly containerised cargo and trailers. All of the Port stevedoring companies are private enterprises.

On the territory of the Port is situated the shipyard 'Baltija' building and reconstructing cargo ships and modern tugboats. On the Port territory there are 3 shiprepair yards with 6 floating docks (the biggest one of capacity 27 thousand tonnes).

The biggest Lithuanian sea carrier – the Shipping Company Lisco (currently in the privatisation process) owns 38 vessels – ro-ro ships, ro-ro/rail ferries, bulkers, general cargo and timber ships (most of them are ice class ships). A considerable number of Lisco ships are newbuilt or reconstructed and belong to Lloyd's or others EU-recognised Registers. In the Port besides the Lisco operate 80 small and very small private shipping enterprises looking for the suitable niches in the shipping market. The number of regular international shipping lines (mainly cargo ships and ferries) operating between the Klaipeda Port and the ports of other countries is constantly increasing.

Activities of the Klaipeda Seaport influence strongly (and are closely connected with) the development of the East – West transport corridor No 9B Kiev-Minsk-Vilnius-Kaunas-Klaipeda. The Corridor No 9 is the part of Pan-European Transport Network approved by EU (Council decision 1692/96IEC).

The modernisation of Klaipeda seaport is one of the highest priorities of the Lithuanian Government. The modernisation is being carried out according to the National Transport Development Programme approved by the Government in 1994 (currently being updated).

Waterborne transport infrastructure investments in Lithuania 1995-1998 have been as follows:

1995		1996		1997		1998	
million Litas	Million EURO	million Litas	million EURO	million Litas	million EURO	million Litas	million EURO
42	10	27	6	70	16	95	22

The main investment projects for the sustainable development of Klaipeda Seaport are: reconstruction and deepening port access channel, further modernisation of the Port railways, reconstruction of quays, improvement of the quality of intermodal networks and logistic services.

In 1998 was modernised ro-ro terminal and in early 1999 was completed the construction of new modern container terminal (capacity 160 000 TEU per year). The modern port television survey system put in the operation in early 1999 is considerably improving the Port safety. This year will be completed the dredging of port waters up to 14 m. and the reconstruction of 5 quays, and the reconstruction works of the port entrance channel are to be commenced. The Free Economic Zone and Logistic Centre in Klaipeda are currently under establishment. To the future plans belongs the construction a deep-water port of 15 - 18m situated north to port entrance channel.

Being a country in accession to European Union, one of our highest priorities is approximation of the national legislation with EU legal acts. This immense work is being carried out according to the National Legal Harmonisation Programme (concerted with European Commission). In maritime transport sector we are firstly

concentrating on the improving safety standards and environment protection, freedom to provide services, right of establishment and free movement of labour.
At present The environmental protection and safety of Lithuanian waterborne transport and port activities is legally covered by Law on Environmental Protection (adopted in 1992), Law on Environmental Impact Assessment (1996), Law on Protection of Marine Environment (1997), Law on Pollution Tax (1991), Law on Air Quality (1981, revised in 1999), Law on Protected Territories (1993, revised in 1995), Law on Klaipeda State Seaport (1996, revised in 1999), Law on Commercial Shipping (1996, revised in 1999), Law on Public Information and relevant orders of the Government and the Ministries of Environment and Transport. Law on Safe Shipping is to be adopted in 1999.

Though the prime responsibility of environmental has been designated to the Ministry of Environmental Protection of Lithuania, the Ministry of Transport is fully responsible for the implementation of the environmental protection policy of the transport sector.

Lithuania has acceded in to the following IMO conventions and protocols: SOLAS 1974, SOLAS PROT 1978, COLREG 1972, MARPOL 73/78, LL 1966, TONNAGE 1969, STCW 1978 and CSC 72. In 1995 Lithuania acceded to IMO and has ratified the United Nations Framework on Climate Change (FCCC) signed in Rio de Janeiro in 1992. The conventions of CLC 92 (civil liability convention), FUND 92 (oil pollution compensation fund), HNS 96 (liability and compensation for damage in connection with the carriage by sea of hazardous and noxious substances), FAL (facilitation of international maritime traffic, 1965) are in the process of ratification.

The following studies financed PHARE, Swedish and Danish Governments, related to waterborne transport environment have been carried out: Transport and Environment, a Comprehensive Strategy, carried out by LT Consultants Ltd. Of Finland and DHV Consultants BV of the Netherlands (final report in 1997) – to provide assistance to organisations implementing or improving an Environmental Management System (EMS) using ISO 14000 Guideline to Environmental Management Principles, Systems and Supporting Techniques, Environmental Management Plans and Training Programmes; Provision of Reception Facilities (REFAC) for Ship-generated waste to facilitate the implementation of the REFAC according to MARPOL 73/78 carried out by Carl Bro International AS of Denmark in 1996; the 4 Projects on Maritime Transport and Safety at Sea and Prevention from Pollution of marine Environment carried out by Swedish National Maritime Administration in 1993 - 1996; A National Oil Spill Contingency Plan for Lithuania has been prepared by Carl Bro International AS in association with Environmental Protection Agency of Denmark in 1995 - 1997. In March 1998 commenced the PHARE Multi-Country Transport Project involving Lithuania, Latvia, Estonia and Poland. – An Early Warning System For The Baltic Sea – aim of what is to improve maritime safety on the Baltic Sea.

The waterborne transport specialists take active part in IMO and HELCOM working sessions and other activities. They are the members of international working groups such as Regional Joint Working Group on Ports and Waterborne Transport of the Baltic Sea initiated and chaired by EC DGVII, Agenda 21 for the Baltic Sea Region (Baltic 21) originally initiated by OECD and EC both dealing with sustainable development (where the considerable emphasis is put on environmental aspects including health and spatial planning), the international working group based on the Memorandum of Understanding concerning the transport of dangerous goods by roll on/roll of vessels in the Baltic Sea.

Our common goal is sustainable transport development minimising the negative environmental effects, serving the economic and social development, ensuring a safe and healthy life for present and future generations in the Baltic Sea Region.

Mr. Vladimir Kozacenko
Head of the Port Division
Maritime Department
Ministry of Transport of Latvia

PRESENT AND FUTURE PLANS IN LATVIAN PORTS

In the field of environment protection Latvia has ratified the MARPOL 73/78 Convention and Helsinki Conventions of 1974 and 1992, as well as joined to several international agreements, including the 1996 document adopted by the Helsinki Commission on Baltic strategies for reception and recycling of ship waste in ports. Ports Authorities are responsible for cleaning polluted waters in the ports' territories, waste reception and recycling, but do not work as a direct operator for these functions having agreements with private companies for these needs.

After extensive analysis of annual results, the Environmental Protection and Regional Development Ministry of the Republic of Latvia every year issues methodical regulations for the plan of actions to follow in case of unexpected pollution in seaports and terminals. These rules determine how companies, institutions and municipalities should act to eliminate pollution danger caused by oil and other dangerous chemicals.

By anticipating scenarios to avoid potential emergency situation, it is necessary to specify the order of passing this information to specialised rescue and civil protection services, duties and responsibility of all executive bodies involved in the crisis situation, the necessary equipment, its designation, capacity and needed quantity, as well as co-ordination between responsible institutions on the local and intergovernmental level.

Following recommendations of HELCOM, Latvian ports have introduced the so – called 'no-special-fee' system for sanitary services to vessels. It means that all ships arriving to the ports pay the sanitary fee regardless of whether they give their polluted for cleaning or not. This practice motivates vessel crews to use the coast – based cleaning equipment.

Every year respective agreements are signed and specialists hired to control operations of enterprises working in the ports' territories and possible actions pointed out which can cause environmental danger. This helps the ports authorities to plan and control soil and water quality improvement works in the polluted territories. For example, according to decision of the Riga Port Board sanation works in polluted territories of former soviet army demand up to 2 percent of the land's cadastral value and this funds are included in the consecutive land lease payments.

During development phase of every new project, it is required that technical regulations are considered and use of water cleaning system is planned in order to avoid potential harm which dangerous oil or chemical products can do if they flow into the city's sewage system.

In Latvian ports all berth users and owners are obliged to get an inspection certificate from the Environmental Protection and Regional Development Ministry's Sea Environment Administration certifying that berths are suitable for certain cargo operations. This certificate has to be applied for every year and should be submitted also to parts' authorities. Our ports announce also the start of a programme for the implementation of environmental management standards according to ISO 14000 and EISO 9000 in all terminals. And we are pleased that the terminal of Finnish company 'Neste' in port of Riga was the first, who has received this international certificates.

In order to ensure that shipping safety in Latvian ports complies with the world standards, the Latvian Sea Administration in close partnership with specialists from the EU PHARE programme developed a project on linking Latvian ports to the unified sea transport information system of the Baltic Sea countries. With participation of Dutch experts from Maritime Systems Technology the project was carried out on setting up new Vessel Traffic Services (VTS) centres in the ports of Riga and Liepaja as well as modernisation of the Ventspils VTS centre, which was built in 1980.

The total cost of the project is estimated at 7 million USD, including 1,5 million ECUs donated to the project by the PHARE programme for construction of the Riga VTS centre.

Free Port of Ventspils development concept includes following major projects:
- construction of Container and Ro-Ro terminal;
- a new crude oil pipeline project;
- expansion of Bulk cargo terminal;
- railway network development;
- Ventspils industrial park project.

The approximate cost of building and developing the new terminal for Ro-Ro and container vessels ('Noord Natie Ventspils terminal') is 70 million USD. The area of the terminal is 36 hectares, in-terminal railway length 5 km, total length of berths 900 m, depth of the berths up to 14,5 m. The project capacity of the terminal is 150 000 TEU/year (with an option to increase to 250 000 TEU/year), 5 000 trailers and 2,0 million tons of general cargoes per year. The building of the terminal began in October 1997. The projected development is two-staged. The first stage will be fully operable by 1st January 2000, the second by 1st January 2003.

The programme for the development of infrastructure of Latvian Oil Transit Corridor (LOTC) is worked out in Latvia considering increase of the demand of throughput capacity of major pipeline routes in Russia, Kazakhstan and other Caspian region states. In 1998 the Joint Stock Company 'Western Pipeline System' (WPS) was established to developed a project for increasing the throughput capacity of LOTC.

One of its founders was JSC 'Ventspils Nafta', the largest crude oil and petroleum products transhipment terminal in the Baltic Sea. The project for the increasing the throughput capacity of LOTC was also titled 'Western Pipeline System'. The project envisages the increase of throughput capacity of WPS by 18 million tins/year by construction of the new oil pipeline Polotsk – Ventspils or Nevel – Ventspils. The conception of the project plans the gradual increase of transit capacity for the existing pipeline system by construction of parallel sections – looping, adequate for the increase of the scheduled oil receipt, with the gradual closing of these looping and new sections after incorporating them into the new oil pipeline network.

The JSC WPS can become an international company, with 40 % of shares held by Russian partners, the remaining volume of share capital could be owned by American, Latvian, Belorussian companies, as well as EBRD, that has already given its consent to participate in the project. JSC 'LUKoil' has showed interest in the project.

In 1999 JSC 'Kalija Parks' opened a new 280 – metre quay – No.4a. The new 14,1 m draught quay, witch equipped with a 3000 t/h shiploader, enable to handle two vessels of 75 000 DWT cargo capacity simultaneously with the loading rate of 20 000 tons per 24-h. The new capabilities are also: simultaneous loading of different types of fertilizers, discharge facilities for up to 115 000 tons of six grades of potash or six other types of fertilizers.

The railway connection Ventspils – Zilupe (Russian border) is one with the biggest capacity in Europe. The average of 20 million tons of cargo were transported along this route in 1998. The project for the increase of the capacity from 20 to 34 million tons was prepared, taking into account both Free Port's Ventspils and Latvian Railway's development plans. The total costs of the project are estimated at 260 million USD. The project is financed by EBRD, EIB, the Latvian Railways and is guaranteed by the Latvian Government. The first stage of the project development will be completed by the year 2002. The project consists of the following:

- construction of the new shunting park 'Juras parks' in Ventspils and northern by - pass;
- extension of Ventspils-2 station including modernisation of signalling and telecom systems;
- development of Ventspils Southern yard and reconstruction of the Venta bridge.

Ventspils Industrial park planned to be established on a 32 ha area. the objective of this project is to create leasable standard factory buildings and dedicated services for small and medium size companies. Attractive package of incentives for investors is offered including:

- no customs duty;
- 0 % excise tax;
- 0 % VAT.

The complex will include 5 to 10 standard industrial buildings (500 – 1000 m^2) with a unified customs point and service buildings.

Since the Freeport of Ventspils is a huge chemical transfer centre, it developed a new Environmental Policy Plan in 1997. The objectives of the plan are clear – the port must solve all existing environmental problems and not create any new ones. The implementation of the plan means that the port has already invested approximately 35 million USD in wastewater treatment, air emission and risk reducing installations.

According to the Riga Port development Programme, between 1999 and 2006 modernisation will cover virtually the whole territory of the port, and the amount of necessary investment is assessed at 170 million USD. The development will require additional territorial growth and most of the presently unused adjacent areas on the left bank of the Daugava will be turned into access ways, storage sections and transport lots. This might cause an environmental impact if a large and economically active industrial zone is set up nearby the city. The problem is faced by Riga Port Authority and it should reach a suitable approach to environmental planning which benefits the port, its users and adjacent communities.

Here are a few of priorities for long – term projects defining by port's development programme:
- widening of the shipping access channel to 150 metres and deeping to 14 metres;
- construction of berths for the Vessel Traffic Service centre serving the specific needs of ice – breaker, pilotage, rescue and other operative services;
- construction of berths and new Wood terminal in the Krievu island;
- construction of berths in the territory of the Passenger port in accordance with the Riga municipality's concept of its overall development;
- reconstruction of railways and overland access roads in the port's territory, optimisation of important access ways outside the port's territory.

An area of specific addressing is the Port Waste Management Plan, which is being developed in co-operation with the Danish Environment Protection Agency and stock company Carl Bro International. This work will serve as a basis in a search for funds to set up a new cleaning machinery and monitoring system, as well as reconstruction and modernisation of the current equipment. This programme will require more than 1 million USD in investments every year within the next few years.

The port of Liepaja enjoys the most southern location of Latvian ports. Owing to a favourable location the port is ice-free even during the severest winters and provides one of the shortest and most economical routes from Western Europe into the CIS countries. With substantial areas of land available for development, Liepaja became a Special Economic Zone in March 1997. This recently gives the port a 'freeport' status, and the surrounding hinterland including major industrial areas, railway terminals, the airport and warehousing facilities are all embraced in the zone.

At present the permissible draught on the navigation roads to the port is 8,5 m, however dredging of port water area up to 12 m is foreseen as one of the port infrastructure first stage projects. The port of Liepaja can accommodate vessels of up to 200 metres and has a total available berthing length of 7 000 metres. Depth of the berths vary from 4,5 m to 10,5 metres. It is obvious that some berths in free Harbour and Karaosta Channel require reconstruction to be used for commercial purposes.

Besides it is foreseen to build completely new terminals to the north and to the south from the entrance to the Karaosta channel in the existing territory of the beach. Altogether by way of renewal existing berths and construction new terminals the total length of the berthing place can reach 12 000 m. Currently the port has a reported capacity of 7 million tons, but under optimal conditions of investment in port infrastructure and superstructure it is expected to promote up to 14 million tons within few years.

Liepaja port has one of the most polluted objects in the Baltic Sea – the territory of the former navy base. Since the economical activities of the port were recommenced in 1992, the evaluation of pollution in the port basin and determination of possible elimination measures has been one of the major tasks for Port Authority. A detailed investigation of the pollution and the ways of its elimination was started by 'Cowi Consul' (Denmark) and Baltec Associates Inc. in 1995 by the request of the Ministry of Environmental Protection and Regional Development of Latvia within Phare programme. The type and the places, the basic means of pollution's elimination, as well as approximate costs of such works were determined. According to project solution, it is foreseen to deposit the polluted soil at the end of the Karaosta canal behind a corrugated wall. Investigations show that pollution contains undissolved heavy metals, oil and other substance, but no radio – active, its localisation in a closed place and covering by sarcophagus sufficiently effective.

It is known that polluted materials on the bottom of the canal are approximately 10 – 50 cm stratum, on the whole 500 000 cubic metres which is necessary to eliminate. The estimated project costs – 10 million USD.

In Latvian ports an active attitude towards environmental quality is being taken constantly through:

- an environmental licensing system that guarantees the incorporating of environmental requirements into each business plan from the start of any industrial activity;
- optimisation of the storage and loading/unloading equipment as well as any potentially harmful installations;
- air quality control and monitoring system to follow up the effectiveness of environmental measures;
- an environmental education programmes for the employees of the ports.

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Director
EP-Logistics Oy, Port Planning Department, Finland

SIMULATION MODELS IN PORT PLANNING

Facts about simulation

There are at least two alternatives in examining the effects of different functional options in a system or in an activity:

- to make changes to the system or function and to measure the effects the changes will accomplish
- to generate an illustration or a model to the computer. Changes made to the model will then be measured by the computer.

Simulation means thus a process, where the reality is illustrated through a miniature size model adaptable to the automatic data processing format.

Why simulation?

Previously the design and planning of ports and terminals was based on the experience of the planners. Solutions, which were proven to be functional in one site, were also implemented in other projects. Thumb rules and educated guesses gathered through experience had a great implication in planning process, however, the functionality of the plans could only be tested in practice. The experience gathered from working units was then extrapolated to bigger and bigger port projects. Today the high investment costs of the ports and terminals makes the tentative construction a hazardous and brave performance.

To use a simulation in planning is not a must. Further it is allowed to make guesswork, calculations and make try and mistakes. Added with a pinch of educated guesses and one can get relatively close to a viable result.

However, exploiting a simulation modelling is far more reliable method to reach successful results. It is a way to find out the functioning of a new system or organisation even before the implementation of the project or before changes have been made to the present system. When developing the operations one has to consider beforehand a great number of items, which without simulation shall come out only in practice.

Worldwide many major ports quite commonly utilise simulation as auxiliary means to assist the port planning process. Examples:

- Port of Long Beach, remodelling and enlargement of the port

The model includes typical port simulation functions, i.e. new routing of truck and railway traffic in the yard areas and scheduling of ship arrivals and departures.

- Durban, Republic of South Africa

Efficiency of the port facilities when presented with various prioritised arriving and departing vessels.

- Riga container terminal

A project financed by the European Commission under the Copernicus 1994 Programme. Simulation was used in the project in order to evaluate the efficiency of different activities in improving the logistic process at the Riga Port Container Terminal.

- La Spezia container terminal, Italy

Simulation is used to support the decision making of the Terminal Management.

- Antwerpen, Belgium

Detailed modelling of the sea going traffic on the entrance channel including navigation logic, tidal variation and lock designing. The simulation contains also an interesting component, which studies the pilotage activities of ships arriving to the Port of Antwerpen.

Most examples above are more or less university level procedure researches, in which the main stress is focused to examine the adaptability of the programs and simulators to the tasks in question.

Advantages of simulation

Simulation
- enables the examination of complicated stochastic systems not possible to analyse through mathematics
- enables to examine different systems in special circumstances
- enables the comparison of alternative systems
- enables to study long period processes in short period or vice versa.

Well designed functioning ports can be created through simulation

In our company the development of simulation was started in the year 1987, in the beginning mainly as an instrument to support our own planning and design work. The initial applications were engineered to assist in planning of materials handling. Afterwards it is also utilised in planning of process automation, ports, terminals and sea going activities.

The use of simulation can generally be recommended in cases when examinations diversified enough can not be prosecuted through analytical methods. Also simulation is recommended in cases, where the object contains complicated and numerous interdependencies or several variables varying occasionally. Normal subjects for simulation are bodies containing of several machines, devices or functions. In port planning such items include e.g.:

- port layout, terminal layout
- routing of cargo handling machinery
- operation of quayside cranes
- yard arrangements
- cargo flows
- comparison of alternative cargo handling systems
- working hour systems
- location of storage and berthing areas
- comparison of alternative internal transport routes
- scheduling of shipments and arriving pattern of ships and cargo

Among other items the following problems can be investigated:
- what is the total capacity of the system
- what are the utilisation rates of the components of the system in different load
- applications
- where and why bottlenecks appear and how they can be solved
- how to locate necessary buffer zones and what will be their capacity
- what are the functional effects of different steering and control systems
- what are the effects of alternative lay-out changes
- how the system behaves when cargo flows are increasing
- how the machine failures and service periods influences to the capacity of the system

The comparison of alternatives is easy when utilising the simulation models. For instance it is easy to quickly change the number of cargo handling machines or their capacity, cargo flows in tons or units, lay-outs or operation periods. After changes have been made, their impact to the behaviour of the system or its components can be easily displayed through simulation and animation.

Phases of simulation

Simulation process can be divided into following phases:
1. Problem definition
2. Data collection
3. Model testing
4. Planning and choosing the simulation parameters
5. Simulation runs
6. Result analysis
7. Possible changes and simulation re-runs
8. Reporting

During the first phase the objectives of a simulation model will be defined. Which problems are being simulated? The identification of the scope of a simulation with accuracy description is an extremely important phase. A model is always a simplification of the real system and all beside the point details should not be included in the model. However it can be difficult to separate the relevant from irrelevant.

The second phase contains data collection and model creation. When re-engineering a system the most data can be obtained from operation statistics and by measuring operation figures of current activities etc. For a completely new system the data need to be analysed, when sufficiently extensive sensitivity analysis are recommended.

The third phase will validate the model and assure compatibility with the key characteristics of the studied system. The testing of a model is usually separated into verification and validation. In verification the operation of a model itself is scrutinised and at the same time programming errors are hopefully exposed. The aim of validation is to guarantee adequate accuracy compared to real life.

In the fourth phase the parameters for simulation runs will be defined. For stochastic i.e. models containing random figures also the amount of the simulation runs is decided to assure the statistical reliability of the results.

The fifth phase comprises of the actual simulation runs. With animation the operation of the model can be monitored during the simulation.

Finally the results and their consistency will be analysed statistically. According to the results conclusions are made in respect of the real life system operation. If the results show inaccuracy in system's operation the model parameters will be changed and simulation runs will be performed again. The assignment and the results are formed into a short report, which is delivered to customer.

At the beginning the introduction of animation as part of simulation process was criticised by simulation experts. General concern was that the result analysis is neglected and conclusions are made according to visual observations of individual simulation run. Decision-making should always be based on several simulation runs and on analysis of numeric data concerned.

User friendliness

In simulation model creation below mentioned possibilities can be utilised:
1. General programming languages (C, C++, Fortran, Pascal)
2. Programming languages for simulation (SLAM, MODSIM)
3. Simulation software (Promodel, Automod, Quest, Extend) or
4. Simulator

The biggest differences between these are in restrictions, flexibility, speed and price. Programming languages require large amount of code scripting and are consequently inflexible and slow method to get results.

In simulator a model is created interactively without coding. Answering questions presented by application inputs the description of studied system. This concept is called parametric simulation. The utilisation of software is easy and a lot faster compared to programming languages. The application area of simulators is however more restricted, hence the suitability of a simulator should be assured case by case.

Experiences from simulation as planning tool

As mentioned earlier, EP-Logistics has used simulation for many years in planning and design of logistics, production technology as well as port activities and shipping procedures. The software is called Promod and it comes from USA. We have also some experience in using MODSIM II software. It should be mentioned that in Finland only two companies use Promod software – we and Nokia.

The most simulation projects have been different cargo handling systems for, which Promod is initially planned. We have noticed it can be successfully utilised in port activities planning. Lately the simulator has been used more and more in production management and sea faring activity studies. MODSIM-software was used in EU funded project SPHERE. The subject was to study processes of small and medium sized ports with developed port models.

Usage experiences

- Model creation time has varied from couple of days to several weeks.
- Data collection and analysis seem to take almost same time as to create the model thereafter.
- Generally speaking simulation project has lasted from few weeks to many months.
- Simulation has proved to be fast and useful method of planning even with complex systems.

The promises made by software suppliers regarding model creation in few hours do not seem to be true. When using simulation is rational, the systems are often so complex that modelling takes time from few days to several weeks. After completion the base model alternative solutions can be studied quickly.

With the simulation of certain control systems has turned out to be so complicated that the basic guiding rules of the simulator are not enough. The if-clauses in Promod have so far been sufficient for additional rule generation.

Animation has proved to be very useful in every project. Firstly with animation we have been able to determine that the model itself is working properly. Secondly with client's representative it has been easy to check the functioning of the system as planned in real life. Additionally watching the animation has generated new ideas how to develop the system. Furthermore animation can be used in training with the implementation of the new system.

When creating simulation model good solution is teamwork of two person: one knows the system to be simulated and the other is familiar with the simulation software. In addition active contribution from client's side to different phases of the project is valuable and important.

Summary

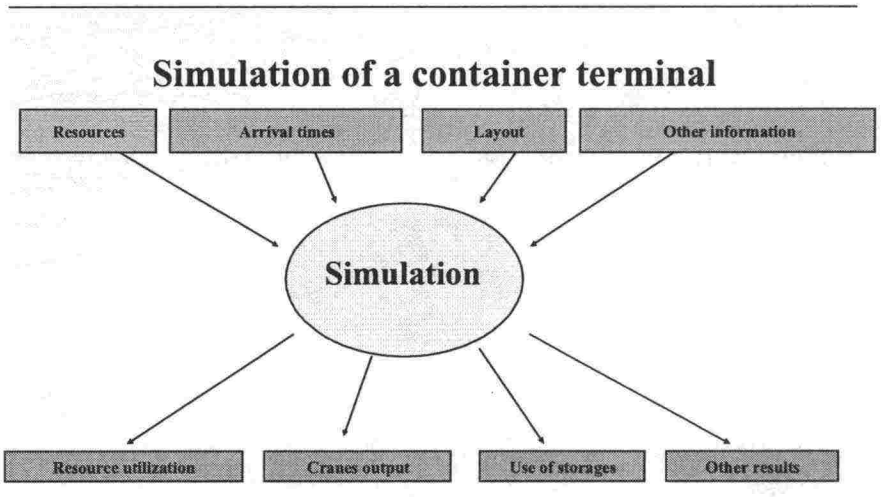
The software development in recent years has brought simulation as noteworthy method of activity planning in ports and in general within sea faring cluster. The various assignments we have had from logistics and materials handling field have strengthened our impression on the usefulness of a simulator in demanding and complex port related systems.

As the investments grow larger in amount, sureness must be in forehand that the chosen system will operate in all conditions as expected. The simulation of the system's operation is a good way to gain this confidence. The so far completed extensive international simulation projects are theoretical in nature. The duration is long and consequently expenses are high. In their short period planning ports seem to require quickly practical results and there simulation software packages like Promod come in.

An example of a simulation model

Some completed simulation projects are being listed next. After that a Container terminal Simulation demo is presented.

Finnish Maritime Administration, Gulf of Bothnia, South West District, Lake District, Gulf of Finland	1999, 1998 and 1997	The organisation of pilot activities in various districts.
European Commission DG VII	1996 - 1999	Small/medium sized Ports with Harmonised, Effective RE-engineered processes 'SPHERE' (in association with several European companies and transport research centres)
Port Authority of Pori	1991	The simulation of organisation model of Port of Pori
Ministry of Transport and Communications	1990	The simulation of ice-breaking activities in the Gulf of Bothnia



Resources

- Number and capacity of straddle carriers
  - 3 straddle carriers on the interchange
  - 5 straddle carriers in other operations
  - speed (full and empty) 2,5 m/s
  - accelerate and decelerate 0,25 m/s2
  - Pick-up and deposit time 30 seconds
- Number and capacity of ship-to shore cranes
  - 4 ssc
  - Cycle time varies from 145 sec to 151 sec, average is 148 sec

Arrival times

- Arrival times for ships
  - ship 2 (unloads 250 containers) arrives in the beginning of simulation
  - ship 1 (unloads 350 containers) arrives after 4 hours
- Arrival times for trucks
  - arrival time between 2 trucks carrying 20 ft containers varies from 18 seconds to 18 minutes, average is 1,2 minutes
  - arrival time between 2 trucks carrying 40 ft containers varies from 12 seconds to 3 minutes, average is 2,1 minutes

Layout

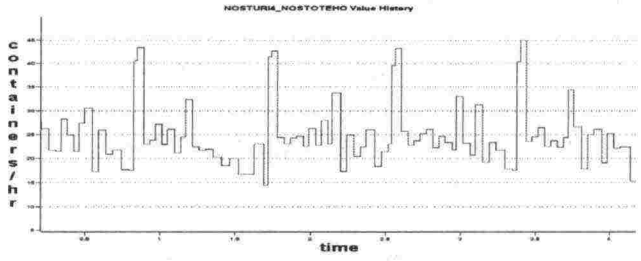
You can include CAD drawing to model or draw layout by simulation software (ProModel).

Other information

- Routes for straddle carriers
- Stacking height
- Decision rules
  - maximum buffer sizes under the cranes (10 containers)
- The amount of initial values depends on detail level of simulation model

Cranes output

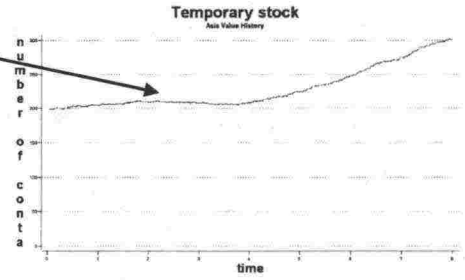
- Temporary output of crane 4



- Average output of crane 4 is 20.5 containers per hour
  (capacity is 24.3 containers per hour)

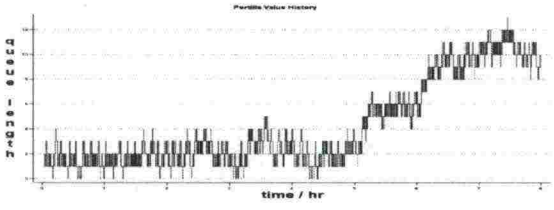
Use of storages

- Storage 1
  - temporary stock
  - minimum stock 199
  - maximum stock 302
  - mean stock 229
  - imported 152
  - exported 49



Other results

- Queue length on gate



- Waiting times on gate

Professor Kaj Riska
Helsinki University of Technology
Ship Laboratory

THE ICE CONDITIONS OF THE GULF OF FINLAND AND THE PREREQUISITES FOR ROUND-THE-YEAR TRAFFIC

Introduction

The present study treats the ice cover in the Gulf of Finland and its influence on shipping. The study is restricted to the Gulf of Finland as several plans to construct new ports there have been presented. These plans stem partly from the changed international situation with new independent states around the Baltic and partly from the fact that oil transportation is finding new routes. Overall, a pressure to increase the shipping through the Gulf has resulted. Both the number of vessels and their size has been predicted to increase putting an increased load on the environment. Before, however, an increase in shipping can be contemplated, the feasibility of the year round navigation system has to be assessed.

The Gulf of Finland is ice covered part of the year. Ice cover causes delays in navigation due to added resistance to ships and causes risks of damage on the hull and propulsion. The Finnish national economy is based on year round shipping from our ports and thus a system to cope with these questions has evolved in Finland during a bit more than a century. It includes:

(a) Ice rules to guarantee the adequate strength of vessels and adequate performance level,
(b) icebreaker assistance given to all vessels which comply with the navigational restrictions,
(c) navigational restrictions stating the minimum dead weight and ice class of vessels which are given icebreaker assistance and
(d) ice-strengthened merchant vessel fleet ensuring safe and economic transportation of passengers and goods.

The system is driven by the transport demand which is more and more tied to schedules. Thus the delays caused when a ship is stuck in ice and is waiting for an icebreaker should be minimised. The stipulation of the adequate performance level ensures that when the ship is being escorted, she does follow the icebreaker smoothly. The navigational restrictions rule out vessels of less ice-going capability because the number of icebreakers is limited and they cannot assist all the vessels. In this study some of the background factors of the winter navigation system are analysed briefly on a conceptual level. The perspective of the study is from an individual vessel, not from the whole system.

The study is made more focused by analysing the ice conditions and their influence on the shipping on definite sea routes in the Gulf of Finland. The description of ice conditions is brief and the values presented form the basis for design of vessels intended to navigate in this sea area. One specific aim here is to show the difference in ice conditions at the entrance of the gulf as compared to those in the eastern part of the gulf.

A conceptual study of factors influencing the winter shipping in the Gulf of Finland would be somewhat abstract without a concrete example. The shipping of oil from Russia through the port of Sköldvik near Porvoo or from a terminal at Primorsk is used as such an example. The ship used in the case study is fictive and does not represent any actual vessel.

The analysis of the influence of ice cover on shipping

The ice cover induces loads on ships and an increased resistance. The ice loading involves a risk of ship damage and in worst cases a total loss. The adequate ice rules developed to design the ship structures have decreased much the possibility for extensive damage but there are still cases which can be considered as accidents i.e. causing loads in excess of the loading assumed by the ice rules. This study is not concerned with the damage risk of ship structures in ice but rather the increased resistance which influences the navigation in ice.

The level ice induces an ice resistance $R_i(h_i,v)$ to ships which increases with ship velocity v and ice thickness h_i. Ship performance in level ice is usually given by the speed - ice thickness diagram which is obtained equating the ship thrust with the ice resistance. If the ship thrust is less than the ice resistance, the ship cannot maintain uniform speed in ice but she must either proceed by ramming or wait for an icebreaker to break the ice. The speed-thickness diagram may be obtained by measurements or by calculations. Judging the theoretical diagrams it should be noticed that natural ice cover is not totally uniform ever and thus ships cannot maintain of less than about 4 knots in level ice without stopping once in a while. Thus prediction of speeds less than this limit are meaningless.

Ice cover is not, however, uniform; due to ice motion ice cover forms ice ridges and leads. This ridged ice forms the most common obstacle for shipping in the Baltic and thus also in the Gulf of Finland.

The ship speed is not uniform in a ridged ice field, the speed increases in the level ice patches between the ridges and the acquired inertia is consumed in going through ice ridges. The ice ridge size in a ridged field is not uniform but rather a statistical quantity following a negative exponential distribution. Thus also large ridges may be encountered and if the encountered ridge is large enough the vessel is not able to penetrate the ridge and gets stopped. A typical plot - obtained by transit simulation calculations - of the ship speed in a ridged ice field is shown in Figure 2. The speed loops are formed when the ship, after being stopped, backs and rams the ridge to get through. In the calculation it was assumed that the ship can back of from the ridge where she got stopped. The inertia of a vessel may, however, force it deep into a large ridge, that deep that she cannot proceed forwards or backwards. This

mechanism of getting stuck in a ridged field is very common for normal merchant vessels. Thus a combination of level ice thickness (determining the ramming speed) and ridge size (determining the amount of ship inertia needed) marks the point from where icebreaker assistance is needed.

Figure 1. A typical ridged ice field from the Baltic (Home page of the Finnish Institute of Marine Research, www.fimr.fi).

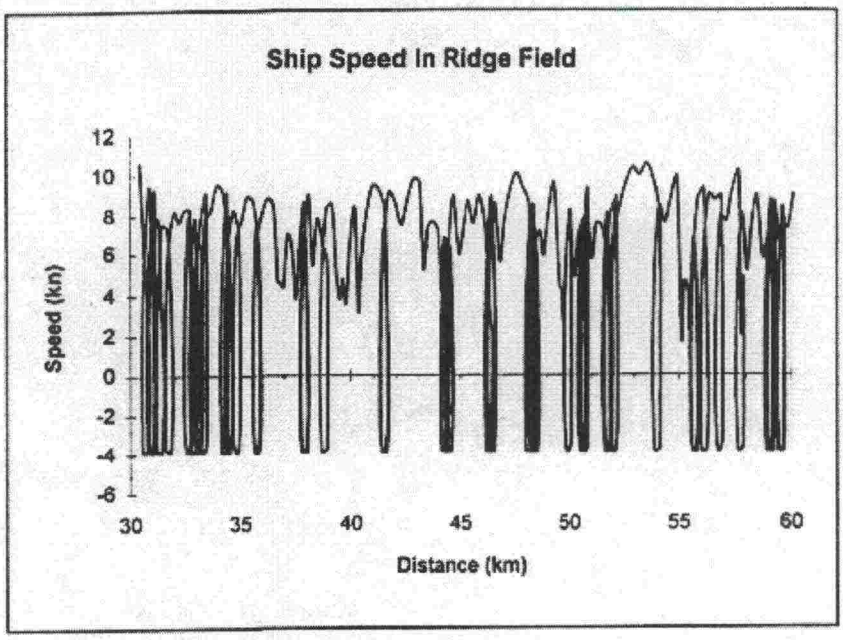


Figure 2. Sample plot showing the general behaviour of a ship in ridged ice (Patey & Riska 1999).

As the ridge density and size are statistical quantities then even if the level ice thickness might be considered known, the resulting transit speeds of ships navigating on a certain route contain a statistical element.

When performing a transport system design, the ship transit speeds should be known. If a transit simulation study is performed, the statistics of ridges should be addressed in some fashion. The most thorough approach is to use Monte Carlo method to create the ridge field along the route and then simulate the ship going through it. This process may be repeated and the final result is a distribution of average speeds. Two examples of such calculations are shown in figures 3 and 4. The ridging severity used in figure 3 takes into account the ridge density and the ridge size distributions whereas the ice numeral I in figure 4 accounts also for the ice thickness and strength. These transit simulation calculations are, however, tedious and as such not suitable for preliminary feasibility studies.

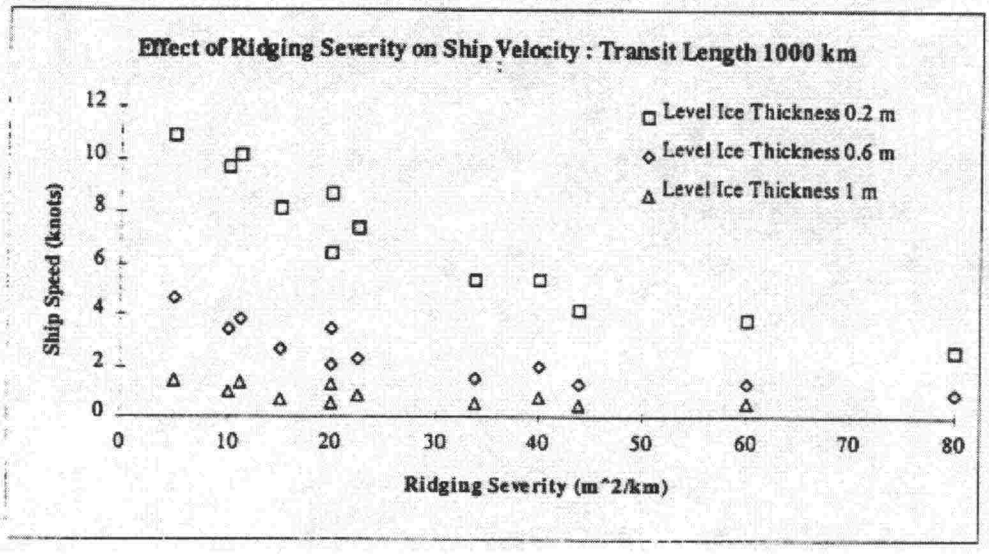


Figure 3. A plot of the average ship speed through a ridge field with a certain ridging severity (Patey & Riska 1999).

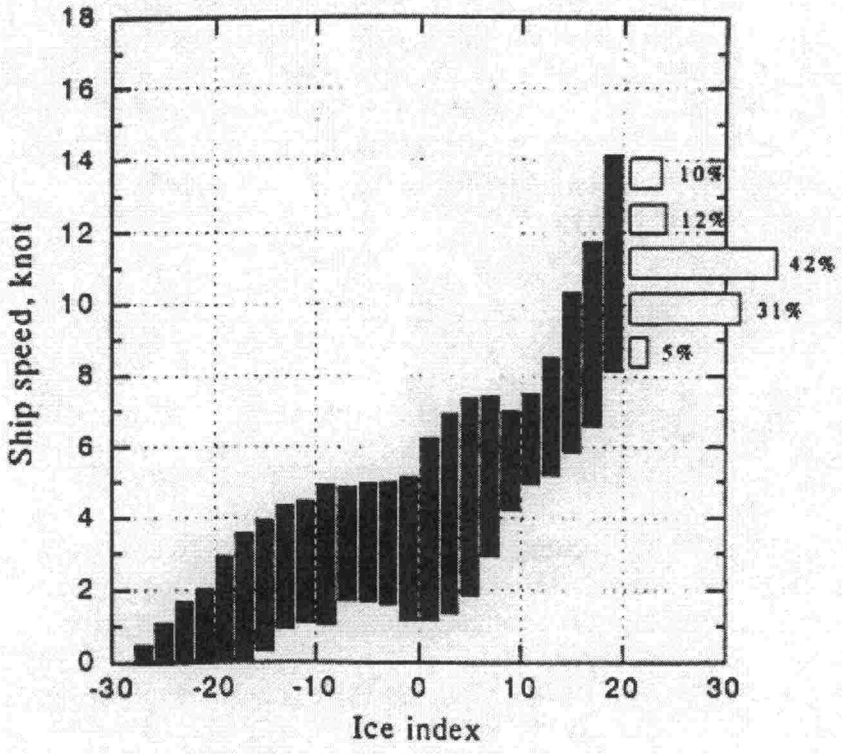


Figure 4. The average ship speed (with scatter) through a ridged ice field based on Monte Carlo simulations shown versus an Ice Index (Kamesaki et al. 1999).

A rough-and-ready estimate of the transit speeds may be obtained describing the ridged field by the level ice thickness h_i and the average thickness of all the deformed ice h_{def}. If the ice resistance in deformed ice is denoted R_{CH} (indicating the analogy of this resistance with the channel resistance), then the total resistance may be estimated as

$$R_{TOT} = R_i(h_i) + R_{CH}(h_{def})$$

This resistance equated with the total propulsion thrust gives an estimate of the average ship transit speed.

When the ship gets stuck in a ridge and needs icebreaker assistance, the rough method outlined above does not give a correct answer as it does not account for the possibility of the ship getting stuck. The calculation must be accompanied by an estimate when the ships are likely to get stuck in ice. A more correct method would again be to use transit simulation, but an estimate is obtained calculating first the size of a ridge which stops the ship with each ramming speed ($H_r = f(v)$) and then - based on the level ice thickness - determine the ramming speed and thus finally obtain the size of the ridge needed to stop the vessel. Ridge statistics are used then to determine whether this size of a ridge is, on average, to be encountered on the route considered.

The above brief description of analysis of ship transit through ice cover is by no means rigorous or comprehensive but it points out the main factors required from ice cover in order to design transportation systems. The mentioned parameters (level ice and deformed ice thickness, ridge size and ridge density) are not the only important parameters. The coverage of ice, ridge consolidation, leads etc. are also important. Here, however, we concentrate on these four parameters and describe the ice winter in the Gulf of Finland in view of these.

Ice conditions in the Gulf of Finland

The ice conditions are presented here as an average for each month. The full reference for the winters is the statistics collected by the Institute of Marine Research in Finland (Climatological ice atlas 1982). Three parameters are used in describing the ice conditions:

1. Ice coverage	This quantity gives the sea area which is covered with ice of a concentration more than 90 %. Ice coverage depends on temperatures but also on prevailing wind directions.
2. Level ice thickness	The level i.e. underformed ice thickness reflects the severity of the winter at any given location. Level ice thickness depends on the cold sum i.e. the time integral of temperature at that location.
3. Deformed ice thickness	Winds, currents and also ships break the ice cover and then winds push the ice into ridges. The amount of ridging may be described by estimating the amount of deformed ice given by the average thickness of it when spread evenly on the whole area.

An example of the resulting description of ice conditions are given in the three charts in the appendix. The last chart giving the amount of ridged ice can be used to calculate the average thickness of the deformed ice as

$$h_{def} = h_i \cdot f_r \cdot \gamma$$

where f_r is the frequency of ridged ice and γ =¼, ½ or ¾ according to the number of black triangles given. The level ice thickness in the above equation is taken from the first chart.

The winters may, for the purposes of transit studies, be divided into three categories: Normal, severe and mild. The severe and mild winters represent the average of the top 10 % and bottom 10 % of the values for each winter. The ice coverage statistics show that in mild winters the ice edge extends in the Gulf of Finland only as west as to Helsinki. During the hardest winters only a small patch of open water may be found in the whole Baltic south of the island Gotland. The level ice thickness exceeds usually 50 cm in the easternmost Gulf of Finland but remains at about 30 cm in the central part of the gulf. The chart about the amount of ridged ice shows clearly the fact that westerly winds prevail in the Gulf of Finland pushing much ice into the eastern part of the Gulf. This brief analysis of ice conditions show that the ice

conditions in the Gulf of Finland are far from uniform; the severity of the conditions increases strongly towards east. In order to illustrate this fact results from a navigability study for a 100 000 tdw tanker on two routes in the Gulf of Finland are analysed next.

Case study of two tanker routes

The ship routes analysed are from Primorsk to Rotterdam (or vice versa) and from Fortum Ltd. terminal at Porvoo to Rotterdam (or vice versa). The total length of the one way voyage from Primorsk is 1295 nautical miles (nm) and from Porvoo 1200 nm. The route is divided into segments for the purpose of this study according to the ice conditions. The routes and route segments are presented in the attached map.

The starting point for the fleet study is formed by the encountered ice conditions; more spesifically the distance to be travelled in ice and the level and deformed ice thickness.

The thickness varies naturally throughout the route but for practical purposes the route is divided into segments in which the thickness is assumed to be constant. The distance to ice edge is presented for both ports in figure 5 for mild, average and severe winters. The ice edge is defined to be where the ice concentration falls below 90 %. The longer distance to be travelled in ice for the port at Primorsk is to be noted.

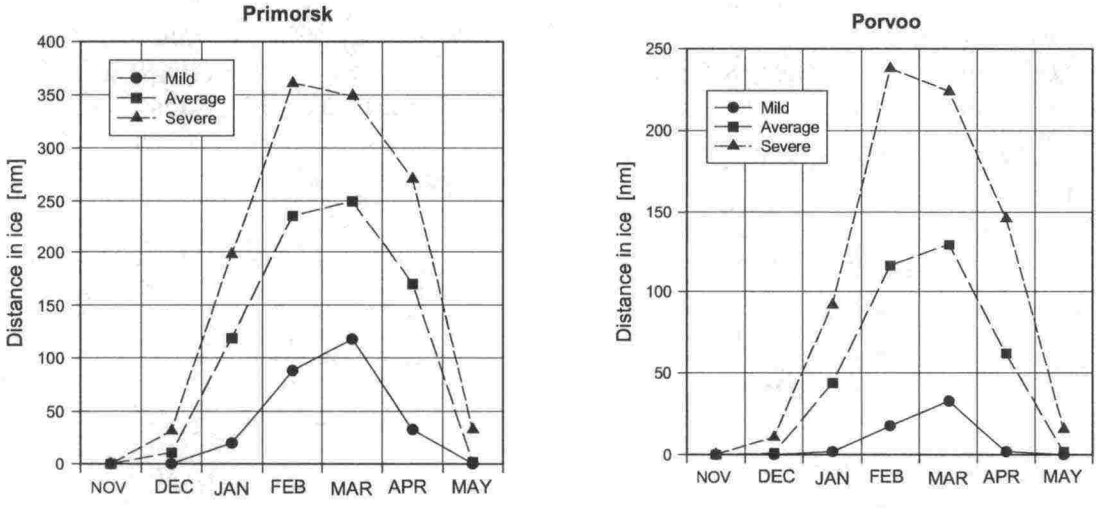


Figure 5. The distance to the ice edge from the ports of Primorsk and Porvoo.

The sum of the level ice and deformed ice thickness for the route segment leading to the ports is presented in figure 6. The ice season is about one month shorter in Porvoo but even during a mild winter ice exists at both ports. This means that the vessels considered for year round operation must be ice strengthened.

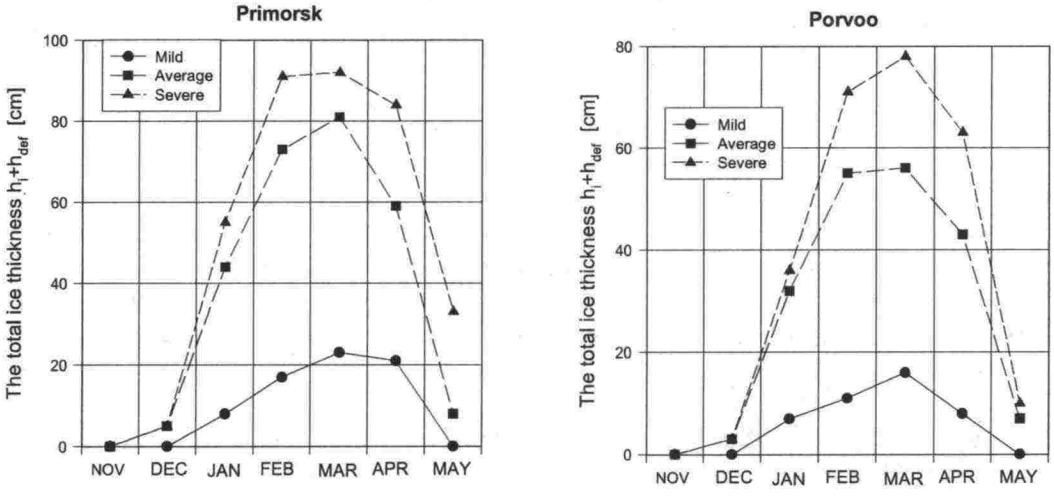


Figure 6. The sum of maximum level and deformed ice thicknesses at the entrance of the ports at Primorsk and Porvoo during mild, average and severe winters.

The ship used in this case study is a tanker of 100 000 dwt with an ice class IA. The length of the vessel is about 260 m. This kind of ship is selected for the case study as it represents the basic vessel considered for this trade. The other alternatives are a normal World Scale tanker without any ice strengthening and a purpose built vessel like DAT (Double Acting Tanker) designed by Kværner Masa-Yards. These alternatives are discussed after the results for the IA-tanker have been presented. The basic transit time for the tanker in open (calm) water 71 h and 76 h from Rotterdam to Porvoo and Primorsk, respectively. As the focus here is the ice transit, only the additional time spent on the route due to ice is presented here. The results are shown in figure 7.

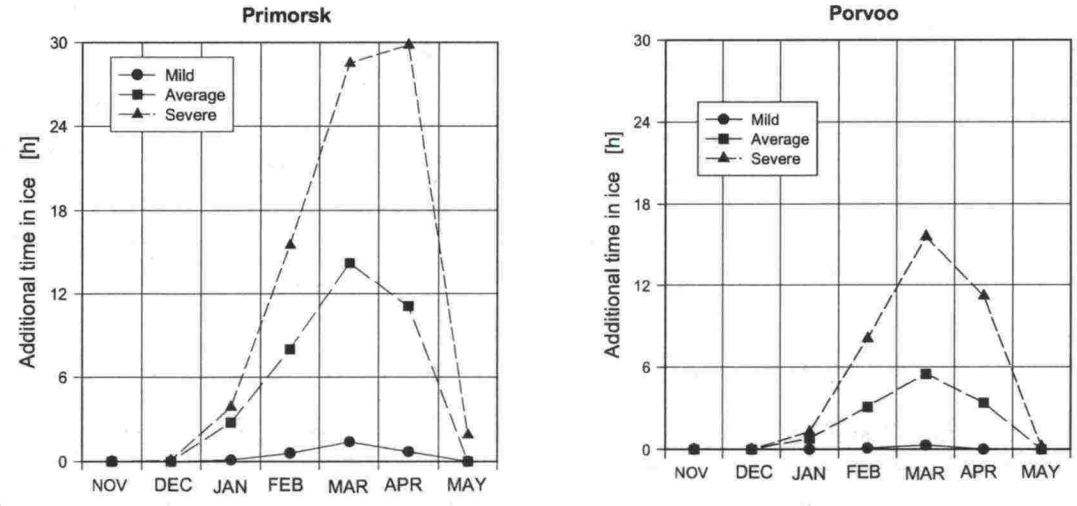


Figure 7. Additional time spent in ice during a voyage from Porvoo and Primorsk to Rotterdam.

During an average winter the delay due to ice is up to 14 hours in a one way voyage to Primorsk and less than 6 hours to Porvoo. This difference in transit times from Porvoo and Primorsk is even larger during a severe winter.

The description of ice cover using the average thickness of deformed ice gives an estimate of the average transit speed but it neglects the possibility of encountering large ridges which stop the vessel. Thus this study must be complemented by an analysis of the probability to get stuck in ridges. From this point in time icebreaker assistance is required. Once the vessel require icebreaker assistance, it has a large effect on the transit times.

There are two ways to estimate if icebreakers are needed. The most straightforward way is to say that the vessels are likely to get stuck when the average speed falls below some limit; 4 knots has been used many times. This gives only a very crude estimate. Another and somewhat more reliable way is to investigate ridge penetration capability of vessels. Assuming that the vessel enters the ridges with the speed determined by the level ice thickness surrounding the ridge and that the kinetic energy is consumed penetrating the ridge then the ridge size the vessel cannot penetrate may be calculated. After determining the limit size of the ridges, ridge statistics should be used to estimate the number of ridges larger than this size on each route segment.

The ridge penetration is described by equating the energy required to penetrate a ridge to the kinetic energy of the vessel. This way the limiting ridge size is obtained for each vessel speed. The results of this calculation are given in Fig. 8 for the ship used in this case study.

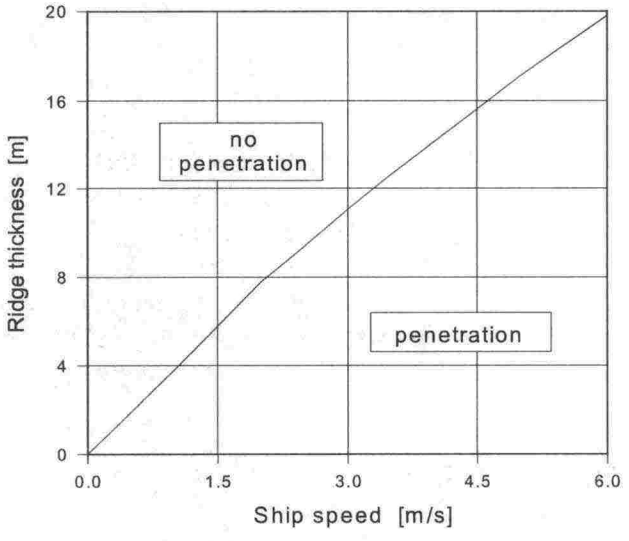


Figure 8. The limiting ridge size which the ship can penetrate using its inertia.

Now the size of the biggest ridge in the first route segment leading to both ports is to be estimated. For this purpose two statistical quantities must be known: the average ridge size and ridge density, but only one number is known; the amount of deformed ice. Here the ridge density is assumed to be 7 ridges/km, a typical value for ridged areas in the Baltic. Using this value and common ridge geometries, the average thickness of ridges may be estimated as

$$H_r = 0.68\sqrt{d \cdot h_{def}}$$

where d is the average distance between ridges. This estimate takes into account only the ridge size statistics. The ridge density statistics and the length of each route segment is to be used next to estimate the average ridge thickness and the largest ridge most probably to be encountered in the last route segment for Primorsk and Porvoo. Finally the ship speed in level ice between ridges in the last route segment into Primorsk and Porvoo may be calculated. This calculation uses the theory developed in the report (Lensu et al. 1996). These results are presented in table 1.

Table 1. The average ridge thicknesses and the speed in the level ice for the last route segment to Primorsk and Porvoo

	Primorsk				Porvoo			
	H_{def} [cm]	$H_{r,av}$ [m]	$H_{r,max}$ [m]	v [knot]	h_{def} [cm]	$H_{r,av}$ [m]	$H_{r,max}$ [m]	v [knot]
Severe	36	4,9	16,2	7,6	31	4,6	14,6	9,1
Normal	29	4,4	14,1	8,6	24	4,0	12,1	10,9
Mild	8	2,3	5,0	9,5	6	2,0	3,6	14,2

Comparing the figure 8 and table 1 it may be concluded that the vessel is likely to get stuck entering Primorsk also during a normal winter whereas this takes place entering Porvoo only during a severe winter. These conclusions are drawn comparing the speed to penetrate certain size of a ridge with the speed in the level ice thickness of that segment. Further, these conclusions are valid for the most severe months which are February and March. Thus icebreaking assistance is needed only seldom in entering Porvoo whereas the Primorsk route requires icebreakers also during an average winter.

The results here were obtained using many assumptions. These are, as a summary, listed here:

1. The ridge resistance is treated as channel resistance
2. The ridging in transit speed calculation is treated by averaging the deformed ice evenly over the route segments
3. The total resistance on which the transit calculations are based is made of the sum of the average ridge resistance taken equal to the channel resistance and resistance of level ice in that segment

4. The ice conditions are described with three parameters: ice extent, level ice thickness and deformed ice thickness
5. The ice conditions are determined as an average for each calendar month
6. The ship is sailing with the full draft in both directions
7. The open water speed is taken as constant throughout the whole open water voyage
8. No waiting times are included into the calculations
9. The analysis of getting stopped in ice uses a simplified ridge penetration modelling and basic ridge statistics.

These assumptions are very crude and a more accurate way to do the transit calculations is to perform a transit simulation where the vessel progress is modelled second by second. This, however, requires much more effort.

The vessel used in the case study is a tanker with an icebreaking bow and ice class IA. As mentioned earlier, other alternative is to use not ice-strengthened vessels which cannot enter Primorsk even during a mild winter but might be able to reach Porvoo. Thus these World Scale tankers are not really an alternative. The other possibility is to use purpose built vessels like DAT. These would be able to navigate into both harbours without icebreaker assistance as the propulsion makes it possible to penetrate ridges slowly but with continuous speed by breaking them with the propeller wash. The economic feasibility analysis of these alternatives is, however, beyond the scope of this presentation.

Summary

The aim of this brief study of ice conditions and trafficability analysis in the Gulf of Finland is to present a way to estimate transit times when planning a transportation system. Also the matter of fleet composition was touched upon. The analysis of ice conditions in the gulf showed that a large difference in severity of ice conditions between the eastern and western ports exists. This conclusion was confirmed by a case study about the transit times of a IA ice class tanker to the ports of Porvoo (Sköldvik) and Primorsk. A large difference in the additional transit times exist and this is augmented by the need of icebreakers during average winters on the route to Primorsk.

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ENVIRONMENTAL CONDITIONS IN PRIMORSK – THE CHALLENGES FOR SUCCESSFUL TECHNICAL SOLUTIONS FOR SAFE SHIPPING

Russia wants a direct export outlet

- Novorossisk/Bosporus
- Ventspils/Latvia
- Primorsk/Baltic Pipeline, Baltic Sea
- Northern Sea Route

Direct access for Russian oil exports

- Black Sea
  - increased environmental concerns in the Bosporus
- Baltic Sea
  - pressure increases as expansion in Bosporus is limited
  - pipeline to Porvoo would give a quick start
  - Primorsk is a difficult location for winter navigation
  - environmental concern for Danish sounds
  - tanker size limitations, special regulations HELCOM leading to purpose-built tanker fleet
- Northern Sea Route
  - direct free access to world oceans, benefit from economy of scale effect
  - ice problems are solved by implementing new technology
  - special tanker fleets to be created

The Baltic obstacle – ice

	Average ice coverage	Average (maximum) ice thickness
Primorsk	140 days	50 (90) cm
St. Petersburg	145 days	55 (90) cm
Helsinki	110 days	40 (80) cm
Tallinn	90 days	35 (85) cm

The Primorsk alternative will

- require purpose-built ice capable tanker fleet
- require investment in emergency response capability
- require icebreaker assistance capability (2 icebreakers for each tanker)
- raise the need for obligatory escorting
- create a big challenge for new innovations
- Finland has 4 icebreakers for the Gulf of Finland
  - guaranteed maximum waiting time 4 hours
- Estonia needs minimum two ice breakers
  - one for Tallinn/Muuga
  - one shallow draught vessel for Pärnu
  - investment need 70 million EUR (ISPA?)
- Who takes care of vessels bound for St. Petersburg/Primorsk?
  - unacceptable waiting times
  - need for co-ordinated operations

Arctic Transportation Development Strategy

A KMY program launched in early 1990's:
- program on environmental studies and field data for creation of proper design tools
- development of new electric propulsion device (Azipod)
- gaining of real operational experience in the Arctic
- development of the 'double acting' concept

The double acting concept (DAT)

- made possible as a result of the podded electric propulsion models
- no compromises for icebreaking
  - bow designed for efficient open water trade
  - stern designed for penetration into difficult ice conditions
- good icebreaking capability with reduced power level
- independent ice operation
- good open water performance due to optimised hull form and the pulling propeller
- six years of experience in Arctic operations (M/T Uikku)
- first newbuilding in operation in 1999 (Wagenborg icebreakers)

Professor Boris Nosov
Deputy Director
Sojuzmorniiprojekt, Russia

THE RESTRUCTURING OF RUSSIAN SEA PORTS – PROBLEMS AND SOLUTIONS

The state of the Russian sea ports

Privatisation and the economical reforms have changed the situation in sea ports in principle. Practically all the State enterprises were privatised. On the base of every State enterprise one or several joint-stock companies were formed. At present the sea ports are presenting a very complicated structure, in which on the one hand are operating port authorities (Marine Administrations) and other state authorities and on the other hand a big number of different private and state organisations. The report contains a short analysis of ports' activities, their problems and possible solutions.

Management models in sea ports

Comprehension of what forms of port's property are considered to be property of the State and what functions are executed by the State in this case. A following management model for the main Russian sea ports is substantiated: port's infrastructure and main means essential for state control are in state property. Management of those forms of property and execution of state's functions is carried out by State Authorities (Port Authorities). The ownership of other forms of property can be any.

Management system in sea ports

In order to carry out the state functions in ports and the management of the state property it is necessary to create a system of marine administrations (port authorities) which will have to spread all over sea ports of Russia. The main functions and the relations with commercial structures and state organisations operating in ports are considered and examined.

Port's dues and rates

The main principles of reallocation of tariff policy and the system of putting them into effect.

The main principles of construction of new ports and development of acting sea ports.

The financial aspects and rights of ownership after final construction are examined.

Mr. Eero Leppänen
Deputy Managing Director
Finnish Ports Association
on behalf of the European Sea Ports Organisation

FINANCING METHODS AND PRINCIPLES OF PORT CONSTRUCTION

Introduction

The European Sea Ports Organisation, ESPO, has always believed that the diversity of the port sector among its members, because they are united within ESPO and can speak with one voice, is strength. At the present time, there is no specific EU legislation that provides a framework leading towards a harmonisation in port management. ESPO would almost certainly voice loud resistance to such a scheme. Nevertheless, because competition between ports is fierce and ports are trying to respond market forces, consensus has been reached in a number of areas. For example:

- there is general agreement that ports should not receive operational subsidies.
- there is a progressive move towards the creation of port entities, autonomous
- bodies, or at least the keeping of separate accounts from those of the State, or
- municipalities, to whom they belong and
- an ESPO call for transparency of accounts, that had unanimous support, to show
- the financial flows between port undertakings and public authorities
- there is a request, jointly with FEPORT, the European organisation of private
- terminal operators lobby for specific State Aid guidelines for ports. It was unfortunately impossible for FEPORT to have a representative here today, but I am sure they would be interested to discuss this subject with you at a next occasion.
- there is also complete rejection of any concept of pan-European co-ordination of port development.

All of these statements add up collectively, to what ports believe is the right framework in which they should operate.

The role of ports as generators of the economy

Full privatisation, has been more or less rejected by Continental Europe, as it is to be seen in the United Kingdom, where the land and regulatory duties have also passed in some cases into private hands. The reason for this perhaps lies in the fact that Member States still feel that their ports operate as generators of economic growth, whether local, regional, national or even international. The result of this is a constantly growing public-private partnership, system that is developing throughout Europe.

This is not to say that there are no purely private ports in Europe. There are, but they are mainly, to date, industrial ports, i.e. serving a specific industrial company. Certain recent projects, however, may change the scene, for example with Wilhelmshaven in Germany, formally, basically an oil port, which is intending to branch out into the container trade. Thus what is emerging is a concept of Port Authorities, that are individual port undertakings, whether public or privately owned.

It is worth mentioning at this stage, that ownership is irrelevant in the eyes of EU Treaty Law. What is required is that Public Funding creates no distortion of competition by favouring one port undertaking above another. Public undertakings, must act in the same way as private undertakings. It is nevertheless true, that there are varying attitudes towards what profit is made. Frequently, the financial aim of many publicly owned ports is not necessarily to make quite so much profit, as their private counterparts, although they must of course ensure that they balance their budgets, including essentially, financing investment.

Public-private partnership

The general trend is to attract private investment under schemes that are known as BOT – Build, Operate, Transfer. The public port undertaking, will place at the disposal of private operators, an appropriate parcel of land, (usually under a concession agreement), for a specified period of time. The period will aim to enable the private investor to build and operate his facilities for a period that is sufficiently long that he may expect to recover his investment in the facilities and make a reasonable return on his investment. The Port Authority undertaking receives a fair rent for the land and is therefore assured of a regular income, to cover the costs of carrying out its statutory and regulator functions. These include ensuring safety of the transit of cargo and navigation, berth allocation and other duties incumbent up it for the benefit of all port users. A second part of its income will come from port dues on shipping frequenting the port.

This is what is frequently termed a Landlord Style Port. There are variations to this style of management, where certain ports also own what are known as superstructure facilities such as cranes or sheds, which are also rented out to port users or operators. This type of management is known as a Tool Port. While nothing, in Treaty Law precludes such ownership by the port, investment in new equipment is also costly, and such equipment is often tailor built for a specific type of cargo. Finding new investment funds is therefore difficult. The trend is therefore to leave superstructure options to the operator, even if the port undertaking has actually built a quay wall. There has therefore been a progressive shift in Tool ports towards a Landlord style port. Which means that some original Tool ports now have some tool style quays and some quays where they are purely Landlord ports. This is frequently the case in the more Southern parts of Europe.

The way in which private investors are attracted is often by an open call for tenders, made on the international market. It is important to respect the rules and to ensure that the evaluation of the tenders is done according to the rules.

Current thinking and developments

A lot of elements that will affect the ports are currently under discussion in the Commission, notably the question raised in the recent White Paper on infrastructure charging. Both ESPO and FEPORT have questioned whether Social Marginal Costs would be an appropriate basis of calculation for ports.

TENs, TINA & Funding

The two organisations have also pointed out, that it is important that ports are treated in the same way as other intermodal modes, such as combined transport platforms and Inland waterway ports. This will be particularly important within the context of TENs – the Trans-European Transport Network and its extension beyond the EU borders, which has involved the TINA – the Transport Infrastructure Need Assessment, process. The process is nearing completion and is expected to conclude in November.

The Commission will, without doubt take account of the conclusions in drawing up its long-term plans for extending TENs eastwards. There will be, as there are through various funding schemes, such as the Cohesion Fund and Regional Structural Funds, opportunities in acceding countries to benefit from some funding. There will also be obligations that will need to be respected to get access to such funding, notably in respect of the environment. ESPO has already expressed the need to ensure that the restrictions, in that regard, placed on EU projects, before they get clearance also apply strictly to projects outside the EU. This is intended to prevent distortion of competition between ports and that investments in acceding countries are not built on speculation for short-term gain, without the possibility for long-term sustainability.

For such projects, as in Europe, emphasis will be placed on sustainable transport mobility. The use of short sea shipping and on-going rail or inland waterway links, especially for freight will obviously be popular from an environmental viewpoint. Even though the funding available from TENs may be small, the acceptation of a project under TENs or within TINA, does have added value for attracting private investors to bid for a project.

We are all convinced that our own project is best. But we are also aware that sometimes, we are all competing for the same trade. Once a project has officially been accepted and is underway, there is a need to reassess all other projects that were in competition, because of the expected trade capacity. Over capacity, as can be seen from the problems in that area experienced by shipping, are just as negative for profitability.

However, there are a great many foreign investments being made in Central and Eastern Europe, in many industrial sectors. Such investment is being made with a view to trade and trade is very rarely internal to one country. It will therefore be

important to assess what the natural growth in trade will produce when assessing the validity of infrastructure projects and needs. That is what free and fair competition is all about.

Efficient government services

To terminate, I would like to add that it is all very well having fine, efficient, facilities, but they are useless, if cargo comes in but cannot transit smoothly through the port. ESPO cannot stress sufficiently that the same reliability and efficiency is required in all the public sectors.

Port operational or logistic services, even when wholly privatised are only as efficient as the weakest link in the chain. By this I mean they are dependant, above all, very frequently, on Government services: Customs, Health, Veterinary Checks, Environmental Impact Assessment, Ecological & Safety Approval Services for care and protection of the environment, etc

These public service operations must also run efficiently. It implies the same integrity in the personnel, as you would expect from a person in private employment, the more so, in fact, since often there is a policing role involved. It is here, that Government has a major role to play. For a transport operator, who is looking to invest and earn a return on his transport investment, the ability to provide efficient public service administrative controls, will be one of the greatest incentives for him to invest.

Mr. Olli Pahkala
Environment Councellor
Ministry of the Environment of Finland

CLOSING REMARKS

This joint seminar has been successful. I have heard very positive comments during both the formal discussions and the informal discussion at coffee and lunch breaks. This seminar has brought together experts from various sectors in maritime transportation, public administration and private enterprises, and from research institutions.

In conclusion, let me underline some issues presented here which are important from the environment protection point of view:

• A comprehensive and transparent Environmental Impacts Assessment in an early stage of planning a new port or before the modernisation of an existing port, especially an oil terminal, is very important. The environmental, health, and safety management system is an important tool for all stakeholders at oil terminals and at other harbours handling dangerous goods.

• Modern maritime safety improvement systems, such as Vessel Traffic System (VTS), connected to the Automatic Identification System (AIS), provide good tools for safe navigation and prevention of accidents. Co-operation and co-ordination between Estonia, Finland and the Russian Federation in this matter could lead to even better and safer practical results.

There are many parallel projects underway aimed at improving oil transportation from Russia, some of them are outside of the Gulf of Finland or even the Baltic Sea. I am sure that not all of them can be realised and build. They are alternatives and ports are competing with each other for this trade. Therefore, the total amount of oil transported in the future in the Baltic Sea and the Gulf of Finland will be less that the total sum of planned transport capacity.

I support the proposal that a similar type of joint seminar should be arranged after two or three years.

On behalf of the Finnish Ministry of the Environment, I wish to thank all the lecturers, panel members and speakers in the discussions, as well as all the planners and the organiser of this successful joint seminar.